ملخص لائحة ٢٠٢٣ للبرامج التخصصية

٢٠٢٣ - ٢٠٢٤

قطاع شئون التعليم والطلاب

كليـــــة الهندسة - جامعـــــة عين شمس

https://eng.asu.edu.eg/education/undergraduates/bylaws

جـــــــــــــدول المحتويـــــات

مـــقدمـــــة

هذا الكتيب هو ملخص لأهم المعلومات والقواعد للائحة ٢٠٢٣، والتي أكدت بشكل كبير على فكرة أن الطلاب هم في النهاية من يمنحون الحياة لأي كيان الأكاديمي. إنهم يلهمون الأساتذة لتقديم أفضل أداء تعليمي، ويدفعون التغييرات التنظيمية، ويمثلون جامعتهم في جميع أنحاء العالم بعد التخرج. إن رضا الطلاب مرتبط بشكل وثيق بجودة البرنامج الأكاديمي، تدريس الأساتذة، بنية الحرم الجامعي، الدعم المقدم للطلاب، التعلم الحر، وتجربة الجامعة بشكل عام والتي يمكن قياسها من خلال التجارب الأكاديمية، وخدمات الدعم، وحياة الحرم الجامعي، ومشاركة أعضاء هيئة التدريس. في النهاية، يؤدي رضا الطلاب إلى تحقيق الرضا الشخصي للطلاب، ومن ثم النجاح الأكاديمي، وقابلية التوظيف، والولاء، ومساهمات الخريجين، وتعزيز سمعة الجامعة.

في هذا السياق، نتعامل مع جيلZ ، المعروف أيضًا باسم"Zoomers" ، الذي يتمتع بخصائص مميزة تتطلب تغييرًا في الأساليب التعليمية. يجب تصميم المقررات بأساليب تربوية تأخذ بعين الاعتبار احتياجاتهم وتتكيف مع التوقعات المتغيرة، والفصول المتنوعة، وأسواق العمل المتطورة. لذا، كلية الهندسة في جامعة عين شمس، كمعلمين ملتزمين ورأس مال بشري، قد قدمت نظامًا أكاديميًا قائمًا على الوحدات. هذا النهج يسمح بتدريس المقرر الواحد باستخدام أساليب تربوية متنوعة، مما يضمن تفاعل الطلاب. كما يشجع أيضًا على الأنشطة الطلابية خارج الإطار الأكاديمي ونظام تدريب ميداني عملي، مما يملأ الفجوة بين التعليم الأكاديمي وسوق العمل.

No matter how prestigious your college is, it is ultimately the students who bring it to life. They inspire professors to excel in their teaching, drive organizational change, and represent their alma mater worldwide after graduation. Student satisfaction is closely tied to program quality, faculty teaching, campus facilities, student support, individual learning, and the overall university experience. It can be measured through academic experiences, support services, campus life, and faculty engagement. Ultimately, student satisfaction leads to student fulfillment, academic success, employability, loyalty, alumni contributions, and university reputation enhancement.

In this context, we are dealing with Generation Z, also known as "Zoomers," who have distinct characteristics that require a shift in educational approaches. Courses should be designed with backward design and learner-centered methodologies to meet their needs and adapt to changing expectations, diverse classrooms, and evolving job markets.Hence, the Faculty of Engineering at Ain Shams University, as dedicated educators and human capital, has introduced a block-based academic system. This approach allows a single course to be taught using various pedagogical methods, ensuring student interactivity. It also promotes extracurricular activities and practical field training, bridging the gap between academics and the job market.

١. مـــــا هـو الجديـــــــد في لائحـــــة ٢٠٢٣

What's New in these bylaws?	ما الجديد في هذه اللائحة؟
Student Centered Approach 'considering current characteristics'	النهج المتمحور حول الطالب "مراعاة خصائصه الحالية"
Embedding / Integrating Business and Industry 'to assure practicality and support employability'	تضمين / دمج الأعمال والصناعة "لضمان التطبيق العملي ودعم قابلية التوظيف"
Introducing Minors 'for Faculty of Engineering students and other students'	إتاحة البرامج الثانوية "لطلاب كلية الهندسة وغيرها من الكليات"
Linking Programs and Courses with Sustainable Development Goals	ربط البرامج والمقررات الدراسية بأهداف التنمية المستدامة
Including Organizational Structure 'for different typologies'	توصيف الهيكل التنظيمي "لأنماط البرامج المختلفة"
Adding Graduation Thesis Course 'to enhance student skills and raise University Rank'	إضافة مقرر أطروحة التخرج "لتعزيز مهارات الطلاب ورفع تصنيف الجامعة"
Applicability to select the Major and Study its Specialization course from the very beginning 'in inter-disciplinary Majors'	إمكانية اختيار البرنامج ودراسة مقرراته الفنية من أول عام أكاديمي "في البرامج البينية"
Counting Professional Certificates as Training Modules	حساب الشهادات المهنية كوحدات تدريبية
Level 2 is a checkpoint 'to aid students in better distribution for working loads'	المستوى 2 هو مستوى مفصلي "لمساعدة الطلاب في توزيع أفضل للأحمال الدراسية"
Getting benefit from the developed HE Eco-system at FoE-ASU 'Portal - CEEE – Training Center – Evolution – Student Chapters - Univ to Life Program …'	الاستفادة من النظام الإيكولوجي المطور في كلية الهندسة جامعة عين شمس (البوابة – مركز التميز – مركز التدريب – مبادرة ارتقاء -- الفروع الطلابية للمنظمات العلمية الدولية - برنامج الجامعة للحياة ...)

٢. مادة (١): البرامـــــــــــج المطروحـــــــة

تقدم كلية الهندسة جامعة عين شمس أنماط متنوعة من البرامج الهندسية بنظام الساعات المعتمدة. كل برنامج تتم إدارته من خلال لجنة مختصة. وتنقسم البرامج طبقا لطبيعتها إلى **٣ أنماط**: **برامج رئيسية تخصصية، برامج رئيسية بينية، وبرامج ثانوية**. حيث تم اختيارها بعناية لتلبية احتياجات سوق العمل المصري، فضلاً عن احتياجات سوق العمل الإقليمي التي توظف العديد من خريجي الجامعات المصرية.

قائمة البرامج الرئيسية في مرحلة البكالوريوس التي تقدمها كلية الهندسة، جامعة عين شمس

البرامج الهندسية الرئيسية	البرامج الرئيسية التخصصية	الهندسة الميكانيكية	١	برنامج التصميم وهندسة الإنتاج
			٢	برنامج هندسة القوى الميكانيكية
			٣	برنامج هندسة السيارات
			٤	برنامج هندسة الميكاترونيات والروبوتات
		الهندسة المعمارية	٥	برنامج الهندسة المعمارية
		الهندسة الكهربائية	٦	برنامج هندسة القوى والآلات الكهربائية
			٧	برنامج هندسة الالكترونيات والاتصالات
			٨	برنامج هندسة الحاسبات والنظم
		الهندسة المدنية	٩	برنامج الهندسة الإنشائية
			١٠	برنامج هندسة المياه والمنشآت الهيدروليكية
			١١	برنامج المرافق والبنية التحتية
	البرامج الرئيسية البينية		١٢	برنامج هندسة المواد
			١٣	برنامج هندسة التصنيع
			١٤	برنامج هندسة الميكاترونيات والأتمتة
			١٥	برنامج عمارة تنسيق المواقع
			١٦	برنامج العمارة والعمران البيئي
			١٧	برنامج الإسكان والتنمية العمرانية
			١٨	برنامج هندسة نظم الاتصالات
			١٩	برنامج هندسة الطاقة والطاقة المتجددة
			٢٠	برنامج هندسة الحاسبات والذكاء الاصطناعي
			٢١	برنامج هندسة البناء
			٢٢	برنامج الهندسة المدنية والبنية التحتية

قائمة البرامج الثانوية في مرحلة البكالوريوس التي تقدمها كلية الهندسة، جامعة عين شمس

الإدارة الصناعية والهندسية
التصنيع
إدارة التصنيع
تقنيات التصنيع
هندسة المواد الطبية الحيوية
هندسة التآكل
هندسة البتروكيماويات
التبريد والتكييف
تكنولوجيات الطاقة المستقبلية
الكترونيات السيارات
هندسة الميكاترونيات والأنظمة المدمجة
مبادئ التصميم المعماري لغير المعماريين
تخصص التصميم المعماري البيئي
إدارة وتطوير العقارات
المدن الذكية والمعلوماتية المكانية
التحضر والتنمية
الدراسات الحضرية
أساسيات هندسة القوى الكهربائية
السيارات الكهربية
الطاقة المستدامة
الالكترونيات الرقمية
الضوئيات
أنظمة وشبكات الاتصالات
أنظمة البرمجيات
الذكاء الاصطناعي
علم البيانات
ألعاب الكمبيوتر
هندسة التصميم الانشائي
مواد البناء للمهندسين غير المهندسين المدنيين
إدارة البناء للمهندسين غير المهندسين المدنيين
هندسة إدارة البناء للهندسة المدنية
هندسة البناء للمهندسين لغير المهندسين المدنيين
النهج الشامل لتصميم المباني
هندسة الجسور: التصميم والإنشاء
تصميم وبناء الطرق السريعة
الهندسة الصحية والبيئية
المساحة
هندسة النقل

تمنح جامعة عين شمس، بناءً على طلب مجلس كلية الهندسة، درجة بكالوريوس العلوم في الهندسة على النحو التالي.

1. **بكالوريوس العلوم في الهندسة الميكانيكية**
   - برنامج التصميم وهندسة الإنتاج
   - برنامج هندسة القوى الميكانيكية
   - برنامج هندسة السيارات
   - برنامج هندسة الميكاترونيات والروبوتات
   - برنامج هندسة المواد
   - برنامج هندسة التصنيع
   - برنامج هندسة الميكاترونيات والأتمتة
2. **بكالوريوس العلوم في الهندسة المعمارية**
   - برنامج الهندسة المعمارية
   - برنامج عمارة تنسيق المواقع
   - برنامج العمارة والعمران البيئي
   - برنامج الإسكان والتنمية الحضرية
3. **بكالوريوس العلوم في الهندسة الكهربائية**
   - برنامج هندسة القوى والآلات الكهربائية
   - برنامج هندسة الإلكترونيات والاتصالات
   - برنامج هندسة الحاسبات والنظم
   - برنامج هندسة نظم الاتصالات
   - برنامج هندسة الطاقة والطاقة المتجددة
   - برنامج هندسة الحاسبات والذكاء الاصطناعي
4. **بكالوريوس العلوم في الهندسة المدنية**
   - برنامج الهندسة الإنشائية
   - برنامج هندسة المياه والمنشآت الهيدروليكية
   - برنامج المرافق والبنية التحتية
   - برنامج هندسة البناء
   - برنامج الهندسة المدنية والبنية التحتية

وتتضمن هذه الدرجة الممنوحة ما حصل عليه الطالب من برامج ثانوية، وفي حال أن الطالب مقيد بكلية أخرى من كليات الجامعة، تتضمن الدرجة الممنوحة له ما حصل عليه الطالب من برامج هندسية ثانوية.

٣. قـــــواعـــــد القبـــــــــول

مادة (١٤): متطلبات الالتحاق ونظام المنح الدراسية

- كلية الهندسة بجامعة عين شمس هي كلية بجامعة حكومية. طبقا للمنصوص عليه في الدستور، تتكفل الجامعة بتقديم البرامج الرئيسية التخصصية بشكل مجاني (بمنحة كاملة). للالتحاق بأحد هذه البرامج التخصصية والاستفادة من هذه المنحة، على الطالب - طبقا للقواعد المنصوص عليها في المادة (75) من اللائحة التنفيذية لقانون تنظيم الجامعات - أن يكون:
  - مستوفيًا لشروط القبول التي يحددها المجلس الأعلى للجامعات.
  - حاصلاً على شهادة الثانوية العامة (علمي رياضة) أو ما يعادلها.
  - مستوفيًا للقواعد الداخلية المعتمدة من مجلس الكلية بشأن قبول الطلاب في هذه البرامج.
- **تشمل المنحة الكاملة إمكانية تسجيل أي مقرر بحد أقصى مرتين بغرض الإعادة أو التحسين، والانسحاب من أي مقرر وتسجيله في فصل دراسي رئيسي لاحق طبقا للقواعد لمرة واحدة فقط. ما يزيد عن ذلك، يلتزم الطالب بدفع المصروفات الدراسية المنفصلة التي يحددها مجلس الكلية كل عام في سنة تسجيل المقرر.**
- **فيما عدا في المستوى الأول، إذا فشل الطالب في الحصول على الحد الأدنى من المعدل التراكمي 2.0 لمدة 4 فصول دراسية رئيسية متتالية يمكن السماح له بصفة استثنائية بتسجيل مقررات لفصلين دراسيين رئيسيين أخريين عن طريق دفع المصروفات الدراسية المنفصلة التي يحددها مجلس الكلية كل عام في سنة تسجيل المقرر (المقررات).**
- **فيما عدا مقررات متطلبات الجامعة ومقررات المستويين الأول والثاني، أي ساعة معتمدة يتم تسجيلها خارج خطة الدراسة لأي سبب من الأسباب لها مصروفات دراسية منفصلة يحددها مجلس الكلية كل عام في سنة تسجيل المقرر.**
- البرامج الرئيسية البينية والبرامج الثانوية لها مصروفات دراسية منفصلة يقررها مجلس الكلية كل عام.
- الطلاب الذين لم يلتحقوا مباشرة بكلية الهندسة جامعة عين شمس من خلال مكتب التنسيق، يمكنهم الالتحاق بالبرامج الرئيسية البينية بشرط تحقيق المتطلبات التي يقرها مجلس الجامعة وذلك في إطار قرارات المجلس الأعلى للجامعات المنظمة في هذا الشأن.
- يُسمح للطلاب الملتحقين مباشرة بكلية الهندسة جامعة عين شمس من خلال مكتب التنسيق التخلي عن الالتحاق بالبرامج الرئيسية التخصصية والانضمام إلى البرامج الرئيسية البينية ودفع المصروفات الدراسية المنفصلة المقررة لها.
- يمكن للطلاب المقيدين في أي من كليات الهندسة بالجامعات الحكومية الأخرى التحويل إلى كلية الهندسة جامعة عين شمس طبقا للقواعد التي يقرها مجلس الجامعة وذلك في إطار قرارات المجلس الأعلى للجامعات المنظمة في هذا الشأن.
- يمكن لمجلس كلية الهندسة بجامعة عين شمس تقديم منح دراسية إضافية لطلاب البرامج البينية (منحة الكلية) الذين حصلوا على معدل تراكمي معين أو الطلاب ذوي التحديات المالية الخاصة وفقًا للقواعد التي يعلنها مجلس الكلية كل عام.
- في حال التحاق أي من الطلاب الثلاثين الأوائل في الثانوية العامة المصرية (علمي رياضة) بأحد البرامج الرئيسية البينية، يتم معاملته كطالب المنحة الكاملة شريطة الحفاظ على معدل تراكمي لا يقل عن 3.3 في كل فصل دراسي رئيسي، وإلا فسوف يتم تطبيق القواعد الأخرى.
- إذا قام الطالب المقيد في أي من البرامج الرئيسية البينية بتسجيل مقررات تعادل أقل 12 ساعة معتمدة في أي فصل دراسي رئيسي بدون عذر مقبول، يلتزم الطالب بدفع مصروفات دراسية منفصلة عن هذا الفصل الدراسي يحددها مجلس الكلية كل عام في سنة هذا الفصل الدراسي تعادل الفارق بين ما تم تسجيله والحد الأدنى للساعات في الفصل الدراسي الرئيسي (12 ساعة معتمدة).
- أي ساعة معتمدة يتم تسجيلها في الفصل الدراسي الصيفي لها مصروفات دراسية منفصلة يحددها مجلس الكلية كل عام في سنة تسجيل المقرر.

- الطلاب الملتحقون بأي من كليات جامعة عين شمس يمكنهم التسجيل للحصول على برنامج ثانوي أو أكثر، ولا يحق للملتحقين بكلية غير كلية الهندسة بأي حال من الأحوال الحصول على درجة البكالوريوس من كلية الهندسة، جامعة عين شمس.
- أي طالب غير مسجل في كلية الهندسة بجامعة عين شمس يمكنه تسجيل أي عدد من المقررات الدراسية مع دفع المصروفات الدراسية المقررة التي يحددها مجلس الكلية كل عام في سنة تسجيل المقرر. يمنح هذا الطالب بيان بالمقررات التي سجل فيها وتقديراته بها. ولا يحق له بأي حال من الأحوال الحصول على درجة البكالوريوس من كلية الهندسة، جامعة عين شمس.

مادة (١٧): التسجيـــــــــل في البرامـــــــــج

- يضع مجلس كلية الهندسة قواعد عامة للقبول في البرامج مع مراعاة رغبات الطلاب ومبدأ تكافؤ الفرص كأساس لقبول الطلاب في البرامج المطروحة، مع الأخذ في الاعتبار القدرة الاستيعابية المتاحة.
- يمكن للطلاب المسجلين في البرامج التخصصية الانتقال إلى البرامج البينية بشرط تحقيق معدل تراكمي لا يقل عن 3.85 بدون دفع المصروفات الإضافية للبرامج البينية. ويمكنهم الاحتفاظ بهذه المنحة طالما أنهم يحافظون على الحد الأدنى من المعدل التراكمي 3.85.
- بمراعاة متطلبات الالتحاق، يمكن للطلاب المقيدين بالبرامج الرئيسية البينية الانتقال إلى البرامج الرئيسية التخصصية بشرط تحقيق معدل تراكمي أكثر من 3.7 ويمكن لمجلس الكلية تقليل هذا الحد على أساس القدرة الاستيعابية المتاحة للبرامج الرئيسية التخصصية.
- **يمكن للطالب التسجيل في برنامج ثانوي أو أكثر بعد اجتياز الطالب المستويين الأول والثاني بشرط تحقيق متطلباته (متطلباتها) وطبقا لقواعد الكلية،** وبالنسبة لطلبة الجامعة من خارج الكلية يمكن التسجيل في برنامج ثانوي أو أكثر من البرامج المسموح لهم بالتسجيل فيها كما هو موضح في الجزء الخامس وطبقا لقواعد الكلية.
- **بالنسبة للبرامج التخصصية:**
  - **يتم تنسيق الطلاب بعد المستوى الأول للالتحاق بأحد التخصصات العامة بناء على رغبات الطلاب والمعدلات التراكمية وطبقا لقواعد الكلية بعد اجتياز الطالب 70% من ساعات المستوى الأول.**
  - **يتم تنسيق الطلاب بعد المستوى الثاني بأحد التخصصات الدقيقة لمرة واحدة بناء على رغبات الطلاب والمعدلات التراكمية وطبقا لقواعد الكلية بعد اجتياز الطالب 80% من ساعات المستويين الأول والثاني.**
  - **لا يسمح للطالب بتسجيل مقررات المستوى الثالث إلا بعد بلوغ معدله التراكمي 2.0 لمقررات المستويين السابقين بإجمالي عدد ساعات 72 ساعة معتمدة.**

مادة (١٩): مستويـــــــــات الدراســـــــــة

- كلما استكمل الطالب 25٪ من متطلبات البرنامج (36 ساعة معتمدة) سوف يتم نقله من مستوى إلى المستوى التالي. ويوضح الجدول التالي حالة الطالب استنادًا إلى العدد المكتمل للساعات المعتمدة التي تم إنجازها.

مستويات الدراسة والعلاقة بينها وبين الساعات المعتمدة التي تم إنجازها

المستوى الدراسي	تعريف موقع الطالب بنظام الدراسة	نسبة الساعات المعتمدة التي اجتازها الطالب
1	المستوى الأول	من 0% إلى أقل من 25%
2	المستوى الثاني	من 25% إلى أقل من 50%
3	المستوى الثالث	من 50% إلى أقل من 75%
4	المستوى الرابع	من 75% إلى أقل من 100%

المستوى الثاني مستوى مفصلي ولا يجوز الانتقال منه إلى المستوى الثالث إلا بعد تحقيق الشروط المذكورة في المادة (١٧).

مادة (٢١): مـــــــــــــدة الدراســـــــــــــة

- **الحد الأدنى لمدة الدراسة المسموح به هو ثمانية فصول دراسية رئيسية.**
- **الحد الأقصى لمدة الدراسة المسموح به هو ثمانية أعوام أكاديمية**، وهو ما لا يشمل الفصول الدراسية المجمدة (وقف قيد – عذر طبي – إلخ..) لأسباب مقبولة من قِبل الكلية، وبعد هذه المدة يتم فصل الطالب من الكلية.
- في حال تسجيل الطالب لأحد البرامج الثانوية، يتم إضافة عام أكاديمي واحد إلى الحد الأقصى لمدة الدراسة المحددة في النقطة السابقة.

يحق لمجلس الكلية السماح للطالب بالتسجيل في فصلين دراسيين رئيسيين متتاليين إضافيين بالإضافة إلى فصل صيفي بشرط اجتياز 75% على الأقل من إجمالي الساعات المعتمدة للبرنامج والتحقق من إمكانية تحقيق متطلبات التخرج. في حال عدم تمكن الطالب من تحقيق متطلبات التخرج خلال هذه المدة الإضافية، يتم رفع موقف الطالب لمجلس الجامعة لاتخاذ القرار المناسب وذلك في حالة اجتياز 85% على الأقل من إجمالي الساعات المعتمدة للبرنامج.

مادة (٢٢): شروط تسجيـــل المقررات الدراسيـــــــة

- يمكن للطالب تسجيل المقررات الدراسية في الفصول الدراسية الرئيسية بحد أقصى لإجمالي للساعات المعتمدة وفقًا للقواعد التالية (بعد موافقة المرشد الأكاديمي):
  - حتى 21ساعة معتمدة أو 8 مقررات دراسية أيهما أكبر، وذلك للطالب الحاصل على معدل تراكمي أكبر من أو يساوى 3.0.
  - حتى 18 ساعة معتمدة أو 7 مقررات دراسية أيهما أكبر، وذلك للطالب الحاصل على معدل تراكمي أكبر من أو يساوى 2.0، ولكن أقل من 3.0.
  - حتى 14 ساعة معتمدة أو 5 مقررات دراسية أيهما أكبر، بالنسبة للطالب الحاصل على معدل تراكمي أقل من 2.0.
- يمكن للطالب تسجيل المقررات في الفصل الدراسي الصيفي بحد أقصى إجمالي للساعات المعتمدة وفقًا للقواعد التالية (بعد موافقه المرشد الأكاديمي):
  - حتى 9 ساعات معتمدة أو 3 مقررات دراسية أيهما أكبر، للطالب الحاصل على معدل تراكمي أكبر من أو يساوى 3.0.
  - حتى 8 ساعات معتمدة أو مقررين دراسيين أيهما أكبر، بالنسبة للطالب الحاصل على معدل تراكمي أقل من 3.0.
- يمكن للطالب تسجيل مقرر دراسي إضافي واحد عن الحدود المذكورة أعلاه وذلك بعد موافقة المرشد الأكاديمي إذا كان سيؤدي الى تخرجه في نهاية هذا الفصل الدراسي، بشرط أن يكون هذا المقرر الدراسي مطروحا في هذا الفصل. وبالنسبة للبرامج البينية، ستتم إتاحة المقرر حتى وإن لم يكن مطروحاً بهذا الفصل.
- في حال تسجيل الطالب لبرنامج ثانوي مع البرنامج الرئيسي الملتحق به وتواجد مقرر (أو أكثر) مشترك بين البرنامجين:
  - إذا كان المقرر إجباريا في البرنامج الرئيسي أو تم تسجيله في البرنامج الرئيسي قبل تسجيل البرنامج الثانوي، يتم اعتبار تقدير هذا المقرر في حساب معدله التراكمي في البرنامج الرئيسي.
  - إذا كان المقرر اختياريا في كلا البرنامجين، وبمراعاة قواعد التسجيل ونظام المنح، على الطالب تحديد اعتبار المقرر في أي من البرنامجين مع اختيار مقرر اختياري آخر في البرنامج الآخر وذلك في بداية الفصل الدراسي الخاص بتسجيل المقرر. وإلا يتم حساب تقدير هذا المقرر في معدله التراكمي في البرنامج الرئيسي.
  - إذا كان المقرر إجباريا في البرنامج الثانوي واختياريا في البرنامج الرئيسي، وبمراعاة قواعد التسجيل ونظام المنح، يتم حساب تقدير هذا المقرر في معدله التراكمي في البرنامج الثانوي، على أن يقوم الطالب باختيار مقرر اختياري آخر في البرنامج الرئيسي.
  - في حال اعتبار تقدير هذا المقرر في حساب المعدل التراكمي للطالب في برنامجه الرئيسي، بالنسبة للبرنامج الثانوي، على الطالب اختيار مقرر آخر من سلة المقررات إذا كان المقرر اختياريا أو يقوم المدير التنفيذي للبرنامج الثانوي بتحديد مقرر آخر يساعد الطالب على اكتساب الجدارات المطلوبة.

يمكن للطلاب الدراسين بهدف الحصول على درجة البكالوريوس والطلاب الدارسين بهدف الحصول على برنامج ثانوي والطلاب الدارسين على غير درجات أكاديمية التسجيل كمستمعين في بعض المقررات الدراسية دون حسابها في المعدل التراكمي بشرط أن

يكون هناك أماكن شاغرة في هذه المقررات، وذلك بعد سداد مصروفات الخدمة الأكاديمية المطبقة التي يحددها مجلس الكلية. والطلاب المسجلين كمستمعين غير مسموح لهم دخول الامتحان النهائي للمقرر الدراسي.

مادة (٢٣): شروط منـــــح درجـــة البكالوريـــوس

- للحصول على درجة بكالوريوس العلوم في الهندسة، يجب على الطالب إكمال عدد الساعات المعتمدة المطلوبة بنجاح في أحد البرامج الرئيسية وفقًا للشروط المنصوص عليها في الجزء الخامس من هذه اللائحة، شريطة الحصول على معدل تراكمي 2.0 على الأقل عند التخرج.
- يجب على الطالب النجاح في جميع المقررات الدراسية التي لها (0) ساعة معتمدة في برنامجه.
- مشروع التخرج هو جزء أساسي من متطلبات التخرج في جميع البرامج ويتم تحديده من خلال الخطط البحثية للأقسام الأكاديمية المرتبطة بالبرنامج، ولا يتخرج الطالب ما لم ينجز متطلبات النجاح بالمشروع. ويجب أن يكون الطالب قد اجتاز بنجاح 70% من إجمالي ساعات البرنامج على الأقل حتى يمكنه التسجيل في مقررات مشروع التخرج في المستوى الرابع.
- يجب أن يقوم الطالب بالتدريب الميداني طبقا للقواعد المنصوص عليها في هذه اللائحة.

يمكن للطالب أن يدرس عددًا من المقررات الدراسية في جامعه أخرى لديها اتفاق تعاون مع جامعه عين شمس بشأن تحويل الساعات المعتمدة. ويتطلب ذلك موافقة مسبقة من كلية الهندسة بجامعة عين شمس. حيث تدرج الساعات المعتمدة لهذه المقررات الدراسية في متطلبات تخرج الطالب، شريطة ألا تتجاوز نسبة هذه الساعات المعتمدة 40% من إجمالي الساعات المعتمدة للبرنامج.

مادة (٢٤): التـــــــــدريب الميـــــــــــداني

- يجب أن يقوم الطالب بالتدريب الميداني لمدة 8 أسابيع في منشأة صناعية أو خدمية ذات صلة ببرنامج الطالب ويجب أن يكون التدريب تحت الإشراف الكامل للكلية. ومن الممكن أيضًا القيام بالتدريب داخل الكلية في بيئة مماثلة.
- يتولى المرشد الأكاديمي الإشراف على متابعة التدريب الميداني.
- يجب تحديد مسؤول الاتصال بالشركة التي تقوم بتدريب الطالب.
- يجب على الطالب أن يقدم تقريرًا فنيًا إلى مرشده الأكاديمي في نهاية فتره التدريب.
- ينقسم التدريب الميداني إلى 4 أسابيع في نهاية المستويين الثاني والثالث. (يمكن أن يكون خلال مدة الدراسة في المستوى الرابع)
- بأي حال من الأحوال لا يسمح بالتدريب لمدة 6 أسابيع في أي مستوى إلا لمرة واحدة خلال فترة الدراسة.
- يقيم التدريب الميداني على أساس ناجح / راسب ولا يدخل في حساب المعدل التراكمي.
- بالنسبة للبرامج التخصصية، في حال استفادة الطالب من فرص التدريب التي توفرها الكلية، على الطالب سداد مصروفات الإشراف على التدريب الميداني والتي يحددها مجلس الكلية في بداية العام الأكاديمي الذي قام فيه الطالب بالتدريب.

يصدر مجلس الكلية -بناءً على توصية لجنة شئون التعليم والطلاب- قائمة بالشهادات المهنية المعترف بها دوليا (OSHA – NDT – LEED AP –IASP – IPMAC - CCNA ...etc) والحمل العملي المناظر. وفي حال حصول الطالب على أحد هذه الشهادات يتم حسابها كبرنامج تدريبي بالمدة المعادلة للحمل العملي المناظر.

مادة (٢٥): إضافة وحذف المـــــقررات الدراســـــية

- يمكن للطالب أن يضيف مقرر دراسي في الأسبوع الأول من الفصول الدراسية الرئيسية، أو في الأيام الثلاثة الأولى من الفصل الدراسي الصيفي وذلك طبقا للتقويم الأكاديمي المعتمد من مجلس الكلية.
- يمكن للطالب أن يحذف المقررات الدراسية المسجل بها مع استرداد المصروفات الدراسية المناظرة، إن وجدت، وذلك حتى نهاية الأسبوع الثاني من الفصول الدراسية الرئيسية، أو نهاية الأسبوع الأول من الفصل الدراسي الصيفي.

يجب ألا يؤدى إضافة أو حذف المقررات الدراسية إلى مخالفة الحد الأدنى أو الحد الأقصى لعدد الساعات المعتمدة المسجلة لكل فصل دراسي.

مادة (٢٦): الانسحـــــاب من المقررات الدراســـــية

- يمكن للطالب الانسحاب من أي مقرر دراسي سجل به خلال الأسابيع العشرة الأولى من الفصول الدراسية الرئيسية أو خلال الأسابيع الخمسة الأولى للفصل الدراسي الصيفي.
- ولا يرسب الطالب في المقرر المنسحب منه، شريطه أن يتم الانتهاء من طلب الانسحاب والموافقة عليه خلال الفترة الزمنية المذكورة في النقطة السابقة.
- ويحصل الطالب في سجله الأكاديمي على تقدير (W) للمقرر المنسحب منه ويسمح له بتسجيل هذا المقرر (مع الحضور الكامل وأداء جميع الأنشطة بما في ذلك الامتحانات) في الفصول الدراسية اللاحقة.

مادة (٢٧): المقررات الدراســـــــية غير المـــكتملة

- إذا لم يحضر الطالب الامتحان النهائي للمقرر الدراسي في فصل دراسي بعذر مقبول من قبل لجنة شؤون التعليم والطلاب ووافق عليه مجلس الكلية، فإن المقرر يعتبر غير مكتمل.
- يحصل الطالب مؤقتا على تقدير (I) في المقرر غير المكتمل، وذلك حتى يتم إجراء الامتحان في هذا المقرر. وإذا لم يقم الطالب بإجراء الامتحان النهائي في الموعد التالي المتاح لامتحان هذا المقرر في أول الفصل الدراسي الرئيسي التالي، فإنه سوف يحصل على تقدير (F) في المقرر الدراسي. وتقدير (I) لن يدخل في حساب المعدل التراكمي للطالب.

يقوم الطالب بالامتحان في أول الفصل الدراسي الرئيسي التالي طبقا للتقويم الأكاديمي التفصيلي المعتمد من مجلس الكلية والمعلن قبل بداية كل عام أكاديمي، وذلك بعد سداد مصروفات إعادة الامتحان التي تعادل مصروفات ساعة معتمدة واحدة ويستثنى من ذلك طلاب البرامج التخصصية في الفصول الدراسية الرئيسية، وتضاف درجات هذا الامتحان النهائي إلى درجات أعمال الفصل الدراسي وذلك لحساب التقدير الكلى لهذا المقرر الدراسي.

مادة (٢٨): إعـــــادة المـــــقررات الدراســـــــية

- يمكن للطالب إعادة مقرر دراسي دراسةً وامتحاناً بهدف التحسين إذا كانت تقديره في هذا المقرر الدراسي يستوفى شرط الحد الأدنى من النجاح، وفقًا للقواعد التالية:
  - يحصل الطالب على التقدير الأعلى في المقرر الدراسي بعد الإعادة. وهذا التقدير هو الذي سيتم احتسابه في المعدل التراكمي للطالب، شريطة أن تظهر حالة الإعادة في شهادة الطالب.
  - الحد الأقصى لعدد المرات التي يمكن للطالب تكرارها بهدف التحسين هو خمس مرات خلال مدة دراسته، ويستثنى من ذلك المقررات الدراسية التي يتم التحسين فيها بغرض الخروج من الإنذار الأكاديمي أو تلبية متطلبات التخرج.
  - لا يجوز التحسين في حال استكمال الطالب لساعات الدراسة الكلية للبرنامج.
  - بالنسبة للمقرر الاختياري، يسمح للطالب بتغييره في الفصول الدراسية اللاحقة. وهذا يخضع لموافقه المرشد الأكاديمي ومتطلبات برنامجه.
  - في حالة رسوب الطالب في الإعادة، فيلغى التقدير السابق للمقرر ولا يعتد به بعد ذلك، ويعتبر راسبا ويحصل على تقدير F.
  - يجب على الطالب سداد المصروفات الدراسية كاملة للساعات المعتمدة المناظرة للمقررات الدراسية التي يتم التحسين فيها.
- إذا رسب الطالب في مقرر دراسي (حصل على تقدير F)، فإنه ينبغي إعادة هذا المقرر الدراسي (الحضور الكامل وأداء جميع الأنشطة)، وفقا للقواعد التالية:
  - أقصى تقدير للمقرر الدراسي المعاد هو +B.

- يحصل الطالب على تقدير المقرر الدراسي بعد الإعادة، وهذا التقدير هو الذي سيتم احتسابه في المعدل التراكمي للطالب، شريطة أن تظهر الإعادة في شهادة الطالب.
- يجب على الطالب سداد المصروفات الدراسية كاملة للساعات المعتمدة المناظرة للمقررات الدراسية التي يتم إعادتها ويستثنى من سداد المصروفات طالب البرامج التخصصية بحد أقصى مرة واحدة لكل مقرر دراسي داخل الخطة الدراسية.

إذا قام الطالب بإعادة مقرر دراسي، فإنه يطلب منه أن يعيد جميع متطلبات تقييم المقرر الدراسي حتى يعاد تقييمه بالكامل. حيث يعاد احتساب تقدير المقرر الدراسي.

مادة (٢٩): وقـــــــــــف القـــــــــيد

يجوز لمجلس الكلية أن يوقف قيد الطالب لمدة أربعة فصول دراسية رئيسية متتالية أو متفرقة خلال مدة الدراسة في الكلية إذا تقدم بعذر يمنعه من الانتظام في الدراسة تم فحصه من لجنة شئون التعليم والطلاب وفى حالة الضرورة يجوز لمجلس الجامعة زيادة مدة وقف القيد.

مادة (٣٠): تقييـــــــــــم الـــــــــطلاب

- توزع درجات كل مقرر كنسب مئوية من الدرجة الإجمالية للمقرر، وتنقسم هذه الدرجات إلى درجات أنشطة الطالب، ودرجات تقييم منتصف الفصل الدراسي، ودرجات التقييم الفني، ودرجات التقييم النهائي.
- مع مراعاة المادة (18)، يجب أن يحضر الطالب ما لا يقل عن 75% من إجمالي ساعات الفصول والمعامل للمقرر الدراسي وإلا يعتبر راسبا ولا يسمح له في هذه الحالة بحضور التقييم الفني أو النهائي للمقرر الدراسي (إن وجد).
- يجوز لمجلس الكلية بناء على دراسة اللجنة التنفيذية للبرنامج وبعد أخذ رأي مجلس القسم المختص وحسب طبيعة المقررات الدراسية، أن يقرر أن يقرر يقرر عقد الامتحان في كل المقرر أو جزء منه بما يسمح بتصحيحه الكترونيا. على أن يتم عرض ذلك على مجلس شؤون التعليم والطلاب بالجامعة للموافقة عليه ورفعه إلى المجلس الأعلى لاعتماده.
- **لكي ينجح الطالب في مقرر دراسي، فإن الحد الأدنى للدرجة التي يجب أن يحصل عليها في التقييم النهائي هي 40 ٪ من مجموع درجات التقييم النهائي، وإلا يعتبر الطالب راسبا في هذا المقرر الدراسي بغض النظر عن مجموع الدرجات التي حصل عليها في هذا المقرر وسوف يحصل على تقدير (F).**
- يرسب الطالب في المقرر الدراسي إذا حصل على تقدير (F) (أقل من 60٪ من درجات المقرر) أو تم حرمانه من حضور التقييم النهائي بسبب تجاوز نسبة الغياب أو الغش ... إلخ، أو لم يحضر الامتحان النهائي دون تقديم عذر مقبول من قبل لجنة شؤون التعليم والطلاب ووافق عليه مجلس كلية الهندسة.

المقررات الدراسية التي لها (0) ساعة معتمدة يكون التقدير فيها راسب أو ناجح ولا يدخل في حساب المعدل التراكمي. ولاجتياز هذه المقررات، يجب على الطالب الحصول على 60 ٪ على الأقل من درجات المقرر.

مادة (٣٢): الفصل من الدراســـــــة والإنذار الأكاديمي

- يحصل الطالب على إنذار أكاديمي إذا كان معدله التراكمي في أي فصل دراسي رئيسي أقل من 2.0.
- يحصل الطالب المسجل في أحد البرامج التخصصية على إنذار أكاديمي إذا كان عدد الساعات المعتمدة المسجل لها بنهاية الفصل الدراسي الرئيسي أقل من 12 ساعة معتمدة.
- إذا تجاوز المعدل التراكمي للطالب 2.0 في أي فصل دراسي، فإنه يتم إعادة حساب عدد الإنذارات الأكاديمية المتتابعة.
- **يتم فصل الطالب من الدراسة إذا لم يقم بالتسجيل في أي مقررات لأكثر من فصلين دراسيين رئيسيين خلال فترة دراسته بدون عذر مقبول من الكلية.**
- **يتم فصل الطالب من الدراسة إذا حصل على معدل تراكمي أقل من 1.0 بعد أول ثلاثة فصول دراسية رئيسية.**
- **بالنسبة لطلاب المستوى الأول في البرامج التخصصية، يتم فصل الطالب من الدراسة إذا حصل على معدل تراكمي أقل من 2.0 في أربعة فصول دراسية رئيسية متتالية.**

- فيما لا يخالف المنصوص عليه في النقطة السابقة، يتم فصل الطالب من الدراسة إذا حصل على معدل تراكمي أقل من 2.0 في ستة فصول دراسية رئيسية متتالية.
- يتم فصل الطالب من الدراسة إذا لم يحقق متطلبات التخرج خلال المدة القصوى للدراسة أو لا تنطبق عليه القواعد المنصوص عليها في المادة (21) من هذه اللائحة.

الطالب الذي يتعرض للفصل من الدراسة بسبب عدم تمكنه من رفع المعدل التراكمي إلى ما لا يقل عن 2.0 سوف تتاح له فرصة إضافية ونهائية للتسجيل في فصلين دراسيين رئيسيين متتاليين بالإضافة لفصل صيفي لرفع معدله التراكمي إلى 2.0 على الأقل وتحقيق متطلبات التخرج، شريطة أن يكون قد أنجز بنجاح ما لا يقل عن 75% من العدد الإجمالي للساعات المعتمدة اللازمة لتخرجه وأن تكون هناك فرصة للطالب لرفع معدله التراكمي إلى 2.0 على الأقل.

مادة (٣٤): مرتبـــــــــــــــة الـــــــــــشرف

لكي يحصل الطالب على مرتبة الشرف، فإن عليه أن يستوفي الشروط التالية:

- الحفاظ على معدل التراكمي 3.3 خلال فترة دراسته في البرنامج مع تحقيق هذا المعدل على الأقل خلال جميع فصول الدراسة.
- ألا يكون قد رسب في أي مقرر دراسي خلال فترة دراسته في البرنامج.

ألا يكون قد تم توقيع أي عقوبات تأديبية خلال فترة دراسته في الكلية.

مادة (٣٥): الحد الأدنى لعدد الطلاب لفتح مقرر دراسي (مقرر اختياري أو خارج خطة الدراسة)

- الحد الأدنى لعدد الطلاب اللازم لفتح مقرر دراسي خارج خطة الدراسة بالبرنامج هو 10 طلاب، أو 75% من عدد الطلاب المسجلين في هذا المستوى من البرنامج، أيهما أقل.
- الحد الأدنى لعدد الطلاب اللازم لفتح مقرر دراسي اختياري هو 5 طلاب أو 25٪ من عدد الطلاب في هذا المستوى من البرنامج، أيهما أقل.

ويتوقف فتح أي من هذه المقررات الدراسية على توافر قائمين بالتدريس وتوافر الموارد اللازمة.

University Requirements

In Egypt, the university is considered a core of Human Thinking at its highest level, and the source of investment and development of human resources. It is responsible for the progress of the Arabian Civilization, sustaining the Historical Heritage of the Egyptian Society, and conserving its traditions. It is also concerned with the education of Religion, Morals and Nationalism (Egyptian National Law for Universities, Law 49 for Year 1972). Therefore, Ain Shams University graduate should be:

Aware of national, regional, and international contemporary issues, to have an intellectual and enlightened personality and to interact effectively in the community through different communication skills.

To achieve this goal, Ain Shams University has designed a number of courses planned to build the student personality, develop his skills, and increase his awareness of different topics. These courses are called University Requirements. The Faculty of Engineering Ain Shams University has selected some of these courses to be offered within the Engineering Programs. These courses are:

Table 1 *List of University requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
ASU041	Technical English Language*	0	4	100	2	2	0	4
ASUx11	Societal Issues**	0	2	50	2	0	0	2
ASUx31	Graduation Thesis	2	3	75	2	0	0	2
-	ASU Elective (1)	2	3	75	2	0	0	2
-	ASU Elective (2)	2	3	75	2	0	0	2
-	ASU Elective (3)	2	3	75	2	0	0	2
-	ASU Elective (4)	3	4	100	3	0	0	3
Total		11	18	450	13	0	0	13
Pool of ASU Elective (1), ASU Elective (2), ASU Elective (3) Courses								
ASUx12	Selected Topics in Contemporary Issues	2	3	75	2	0	0	2
ASUx13	Climate Change, Energy and Water Issues***	2	3	75	2	1	0	2
ASUx21	History of Civilizations	2	3	75	2	0	0	2
ASUx22	Literature and Arts	2	3	75	2	0	0	2
ASUx23	Music Appreciation	2	3	75	2	0	0	2
ASUx24	Egyptian Identity and Other Cultures	2	3	75	2	0	0	2
ASUx32	Critical Thinking***	2	3	75	2	1	0	2
ASUx42	Innovation and Entrepreneurship***	2	3	75	2	1	0	2
ASUx43	Introduction to Marketing***	2	3	75	2	1	0	2
ASUx44	Introduction to Accounting***	2	3	75	2	1	0	2
ASUx45	Business Administration	2	4	100	2	0	0	2
ASUx46	Legislations and Professional Ethics***	2	3	75	2	1	0	2
ASUx47	Professional Ethics	2	3	75	2	0	0	2
ASUx48	Scientific Research***	2	3	75	2	1	0	2
MDP112	Principles of Computer Graphical Representation	2	3	75	1	2	1	4
ARC131	History of Arts and Architecture	2	3	75	1	2	0	3
ARC142	Fundamentals of Computer Graphics	2	3	75	1	2	1	4
UPL121	Community Participation in Development	2	3	75	1	2	1	4
Pool of ASU Elective (4) Courses								
ASUx41	Report Writing and Communication Skills	3	4	100	2	2	0	4
CSE141	Introduction to Computer Programming	3	4	100	2	1	2	5

* A placement test in Technical English Language will be conducted for some admitted students to the Faculty of Engineering according to regulations announced by the Faculty Council. If the student passes this test, then he will be exempted from taking the Technical English Language Course. The Technical English Language course is a pre-requisite for all Faculty requirements courses.

** Based on the rules of the university, the student has to pass this course in any main semester before the graduation.

*** Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Faculty Requirements

All Majors offered at FoE - ASU are Engineering Programs. The graduates have the privilege of being Engineers and are automatically enrolled in the Egyptian Engineering Syndicate (EES). The graduates are also entitled to take the Fundamentals of Engineering Exam offered by the National Council of Examiners for Engineering and Surveying (NCEES), based on the agreement between EES and NCEES. According to the National Academic Reference Standards (NARS-2018), The Engineering Graduate must be able to (A-Level):

1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
5. Practice research techniques and methods of investigation as an inherent part of learning.
6. Plan, supervise and monitor implementation of engineering projects.
7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

In addition, ASU – FoE Graduate must be able to:

11. Adapt and/or mitigate with changing circumstances and environments that are related to engineering issues.
12. Relate engineering issues to Sustainable Development Goals and deal with ecosystems related to them on the local or global level.

To achieve these Competencies, a set of courses must be completed as a Faculty Requirement. These courses are divided into Basic Science Courses and Basic Engineering Courses.

Table 2 *List of Faculty requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
PHM011	Basic Mathematics*	0	4	100	2	2	0	4
ENG2xx	Field Training	0	8	200	0	8	12	20
PHM111	Mathematics (1)	3	5	125	2	2	0	4
PHM112	Mathematics (2)	3	5	125	2	2	0	4
PHM113	Probability and Statistics**	2	3	75	2	1	0	2
PHM121	Vibration and Waves	3	5	125	2	2	1	5
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5
PHM141	Engineering Chemistry	3	5	125	2	1	2	5
DEP39x	Graduation Project (1)***	1	2	50	1	0	0	1
-	Mechanics (1) Elective	3	5	125	2	2	0	4
-	Mechanics (2) Elective	3	5	125	2	2	0	4
-	Engineering Technology Elective	2	3	75	1	2	0	3
-	Engineering Drawing Processing Elective	2	4	100	1	2	0	3
-	Structures and Properties of Materials Elective	2	3	75	2	0	0	2
-	Spatial Perception and Design Elective	2	3	75	1	2	0	3

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
-	Engineering Economy and Project Management Elective	2	3	75	2	0	0	2
Total		34	64	1600	24	28	16	67
Pool of Mechanics (1) Elective Courses								
PHM131	Statics	3	5	125	2	2	0	4
CES111	Fundamentals of Structural Mechanics (1)	3	5	125	2	2	0	4
Pool of Mechanics (2) Elective Courses								
PHM132	Dynamics	3	5	125	2	2	0	4
CES112	Fundamentals of Structural Mechanics (2)	3	5	125	2	2	0	4
Pool of Engineering Technology Elective Courses								
MDP181	Production Engineering	2	4	100	1	1	2	4
MDP182	Manufacturing Processes**	2	4	100	2	0	1	2
ARC151	Basics of Conventional Construction Systems	2	4	100	1	3	0	4
ECE121	Communication Systems Engineering Fundamentals**	2	3	75	2	1	0	2
CES253	Properties and Testing of Materials**	2	3	75	2	1	0	2
CSE142	Introduction to Software Engineering**	2	4	100	2	1	0	2
Pool of Engineering Drawing Processing Elective Courses								
MDP111	Engineering Drawing	2	4	100	1	2	1	4
ARC141	Architectural Representation	2	5	125	0	5	0	5
ARC143	Building Engineering Drawing	2	4	100	1	3	0	4
CSE381	Image Processing**	2	4	100	2	1	0	2
CEI231	Civil Drawing	2	4	100	1	3	0	4
Pool of Structures and Properties of Materials Elective Courses								
PHM123	Introduction to Physical Electronics**	2	3	75	2	1	0	2
PHM221	Quantum Physics**	2	3	75	2	0	1	2
MDP151	Engineering Materials**	2	4	100	2	0	1	2
MDP251	Structure and Properties of Materials**	2	4	100	2	0	1	2
EPM113	Properties of Electrical Materials**	2	5	125	2	1	0	2
CES251	Structures and Properties of Construction Materials**	2	3	75	2	1	0	2
CES263	Soil Mechanics and Properties of Construction Materials	2	3	75	1	2	0	3
Pool of Spatial Perception and Design Elective Courses								
MDP461	Materials for Energy Solution**	2	4	100	2	1	0	2
MDP483	Lean Manufacturing System**	2	3	75	2	1	0	2
ARC111	Fundamentals of Architecture Design	2	5	125	0	5	0	5
ARC217	Fundamentals of Architectural Engineering	2	5	125	1	1	2	4
EPM456	Renewable Resources Interfacing**	2	4	100	2	1	0	2
ECE441	Antenna Engineering and propagation**	2	4	100	2	1	0	2
CSE121	Introduction to Logic Design**	2	5	125	2	1	0	2
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4
Pool of Engineering Economy and Project Management Elective Courses								
MDP333	Industrial Project Management**	2	3	75	2	1	0	2
MDP432	Engineering Economy**	2	3	75	2	1	0	2
MEP441	Project Management and Engineering Economy	2	3	75	2	0	0	2
MEA432	Project Management for Mechanical Engineering**	2	3	75	2	1	0	2
ARC371	Architectural Projects Management and Economics**	2	3	75	2	1	0	2
UPL272	Society and Housing Economics	2	3	75	1	2	0	3
UPL471	Urban Economics	2	3	75	1	2	0	3
EPM111	Engineering Economy and Investments**	2	3	75	2	1	0	2
EPM314	Project Management for Electrical Engineering**	2	3	75	2	1	0	2
EPM315	Projects Economy and Management**	2	3	75	2	1	0	3
CSE432	Software Project Management**	2	3	75	2	1	0	2
CES371	Project Management Essentials in Construction**	2	3	75	2	1	0	2
CEI324	Engineering Economics and Management	2	3	75	2	0	0	2

* A placement test in Mathematics will be conducted for all admitted students except some High School Degrees which are determined by the Faculty Council. If the student passes this test, then he will be exempted from taking Basic Mathematics Course.

** Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

*** The code for the Graduation Project (2) depends on the program, it is mentioned in the study plan or each program.

Discipline Requirements

According to the National Academic Reference Standards (NARS-2018), each discipline graduate (Mechanical – Architectural – Electrical – Civil), has to meet specific competences.

Mechanical Engineering Requirements

In addition to the Competencies for all Engineering Programs the Basic Mechanical Engineering graduate must be able to (B-Level):

13. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.
14. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.
15. Select conventional mechanical equipment according to the required performance.
16. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.

To achieve these Competencies, a set of courses must be completed as a Basic Mechanical Engineering Requirement.

Table 3 *List of Basic Mechanical Engineering Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4
MDP211	Machine Construction	3	5	125	2	2	1	5
MDP212	Mechanics of Materials*	2	4	100	2	1	0	2
MDP213	Mechanics of Machines	4	7	175	3	2	1	6
MDP311	Machine Elements Design	4	6	150	2	2	3	7
MDP312	Mechanical Vibrations	3	5	125	2	2	1	5
MDP252	Metallurgy and Material Testing	3	4	100	2	1	2	5
MDP281	Manufacturing Technology	4	6	150	3	2	1	6
MEP211	Thermal Physics	4	6	150	3	2	1	6
MEP212	Fluid Mechanics	4	6	150	3	2	1	6
MEP311	Heat Transfer	4	6	150	3	2	1	6
MCT411	Hydraulics and Pneumatics Control*	2	4	100	2	0	1	2
MCT331	Mechatronic Systems Integration*	2	4	100	2	0	1	2
EPM214	Electrical Circuits and Machines	4	6	150	3	2	0	5
ECE212	Introduction to Electronics*	2	4	100	2	1	0	2
CSE232	Fundamentals of Computer Programming*	2	4	100	2	0	1	2
DEP491	Graduation Project (2)**	2	4	100	1	2	0	3
-	General Mechanical Elective Course	3	5	125	2	2	0	4
-	Mechanical Control Elective Course	3	5	125	2	2	0	4
-	Measurements and Sensors Elective Course	3	5	125	2	2	0	4
Total		61	101	2525	45	31	15	86
Pool of General Mechanical Elective Courses								
MDP351	Casting and Welding	3	5	125	2	2	1	5
MEP313	Applied Thermodynamics	3	5	125	2	2	1	5
MEA311	Automotive Engineering	3	5	125	2	2	0	4
MCT441	Design of Autonomous Systems	3	5	125	2	2	1	5
Pool of Mechanical Control Elective Courses								
MEP331	Automatic Control	3	5	125	2	2	1	5
MCT311	Control Systems Design (1)	3	5	125	2	2	1	5
MCT341	Control and Automation	3	5	125	2	2	1	5

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
Pool of Measurements and Sensors Elective Courses								
MDP381	Measuring Instruments and Metrology	3	5	125	2	0	3	5
MEP332	Measurements and Instrumentation	3	5	125	2	0	3	5
MCT332	Engineering Measurements and Sensors	3	5	125	2	2	1	5

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

** The code for the Graduation Project (2) depends on the program, it is mentioned in the study plan or each program. Distribution of the contact hours may vary according to the program.

Architectural Engineering Requirements

In addition to the Competencies for all Engineering Programs the Basic Architectural Engineering graduate must be able to (B-Level):

14. Create architectural, urban and planning designs that satisfy both aesthetic and technical requirements, using adequate knowledge of: history and theory, related fine arts, local culture and heritage, technologies and human sciences.
15. Produce designs that meet building users' requirements through understanding the relationship between people and buildings, and between buildings and their environment; and the need to relate buildings and the spaces between them to human needs and scale.
16. Generate ecologically responsible, environmental conservation and rehabilitation designs; through understanding of: structural design, construction, technology and engineering problems associated with building designs.
17. Transform design concepts into buildings and integrate plans into overall planning within the constraints of: project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations and procedures involved.
18. Prepare design project briefs and documents; and understand the context of the architect in the construction industry, including the architect's role in the processes of bidding, procurement of architectural services and building production.

To achieve these Competencies, a set of courses must be completed as a Basic Architectural Engineering Requirement.

Table 4 *List of Basic Architectural Engineering Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
ARC211	Principles of Architecture Design Studio	3	6	150	1	4	0	5
ARC212	Principles of Visual Design and Design Methods	3	5	125	2	2	0	4
ARC213	Creativity Design Studio	3	6	150	1	4	0	5
ARC311	Building Type and Legislations Design Studio	3	5	125	1	4	0	5
ARC312	Architectural Technology Design Studio	3	6	150	1	4	0	5
ARC231	History of Arts and Architecture (1): Ancient Civilizations	2	4	100	2	0	0	2
ARC331	History of Arts and Architecture (2): Islamic and Western Architecture	2	4	100	2	0	0	2
ARC241	Visual Communication in Architecture	3	5	125	1	4	1	6
ARC242	Modeling of The Built Environment	2	4	100	1	3	0	4
ARC251	Building (1): Conventional Construction Systems	3	5	125	2	3	0	5
ARC252	Building (2): Finishing Works	3	5	125	2	3	0	5
ARC351	Building (3): Advanced Construction and Working Drawing Standards	3	5	125	1	5	0	6
ARC352	Working Design (1): Systems Coordination and Building Information	3	6	150	1	4	1	6
ARC362	Daylighting and Control of Thermal Environment	3	3	75	2	2	0	4
UPL211	Principles of Urban Design and Landscape	3	4	100	1	4	0	5
UPL311	Context and Place Design Studio	3	5	125	1	4	0	5
UPL312	Urban and Landscape Design Studio	3	5	125	1	4	0	5
UPL321	History and Theory of Urbanism	3	5	125	2	2	0	4
CEP213	Surveying and Site Mobility	2	4	100	1	2	1	4
CES213	Structural Analysis for Architects	2	3	75	1	2	0	3
CES315	Concrete and Steel Structures	3	5	125	2	2	0	4
MEP341	Technical Installations*	2	3	75	2	1	0	2
DEP491	Graduation Project (2)**	3	4	100	1	4	0	5
	ARCH Elective (1)	2	3	75	2	0	0	2
	ARCH Elective (2)	2	3	75	1	2	0	3
Total		67	113	2825	35	69	3	106
Pool of ARCH Elective (1) Courses								
UPL212	Placemaking and Place Identity*	2	3	75	2	1	0	3
UPL271	Human Behavior and the Built Environment*	2	3	75	2	1	0	3
UPL231	Site Analysis	2	3	75	1	2	0	3

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
UPL241	Horticulture and Garden Design*	2	3	75	2	1	0	3
UPL281	Introduction to Geographic Information Systems	2	3	75	1	0	3	4
Pool of ARCH Elective (2) Courses								
ARC321	Modern Art Movements	2	3	75	1	2	0	3
ARC345	Model Making and digital fabrication	2	3	75	1	2	0	3
ARC341	Photography and Architecture	2	3	75	1	2	0	3
ARC342	Data Modeling and Programming for Architects	2	3	75	1	2	0	3
ARC343	Media and Filmmaking for Architects	2	3	75	1	2	0	3
ARC344	Digital Graphics and Animation	2	3	75	1	2	0	3

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

** The code for the Graduation Project (2) depends on the concentration, it is mentioned in the study plan or each concentration.

Electrical Engineering Requirements

In addition to the Competencies for all Engineering Programs the Basic Electrical Engineering graduate must be able to (B-Level):

14. Select, model and analyse electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
15. Design, model and analyse an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
16. Design and implement elements, modules, sub-systems, or systems using technological and professional tools.
17. Estimate and measure the performance of an electrical/electronic system and circuit under specific input excitation and evaluate its suitability for a specific application.
18. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.

To achieve these Competencies, a set of courses must be completed as a Basic Electrical Engineering Requirement.

Table 5 *List of Basic Electrical Engineering Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4
PHM224	Physics of Semiconductors and Dielectrics	3	5	125	2	2	0	4
EPM211	Electric Circuits (1)	3	5	125	2	2	1	5
EPM212	Electromagnetic Fields	3	5	125	2	2	0	4
EPM213	Electrical Measurements	3	5	125	2	2	1	5
EPM221	Energy Conversion and Renewable Energy	3	5	125	2	2	1	5
ECE211	Electronics	3	5	125	2	2	1	5
ECE251	Signals and Systems Fundamentals	3	5	125	2	2	0	4
CSE211	Logic Design	3	5	125	2	2	0	4
CSE231	Computer Programming*	2	4	100	2	0	1	2
CSE271	System Dynamics and Control Components	3	5	125	2	2	1	5
DEP491	Graduation Project (2)**	2	4	100	1	2	0	3
-	Elective Course for Advanced Mathematics	3	5	125	2	2	0	4
-	Elective Course for Electrical Systems	3	5	125	2	2	0	4
-	Elective Course for Circuits	3	5	125	2	2	0	4
-	Elective Course for Control	3	5	125	2	2	0	4
-	Elective Course for Transmission and Communications	3	5	125	2	2	0	4
-	Elective Course for Networks	3	4	100	2	2	0	4
-	Elective Course for Embedded Systems	3	5	125	2	2	1	5
-	Elective Course for Automation and Organization	3	5	125	2	2	0	4
Total		58	97	2425	39	38	7	83
Pool of Advanced Mathematics Elective Courses								
PHM311	Discrete Mathematics	3	4	100	2	2	0	4
PHM312	Complex Variables, Special Functions and Partial Differential Equations	3	5	125	2	2	0	4
EPM433	Statistical Methods in Power System Planning	3	4	100	2	2	0	4
Pool of Electrical Systems Elective Courses								
EPM332	Power Systems Analysis (1)	3	5	125	2	2	1	5
ECE352	Analog and Digital Communication Systems	3	5	125	2	2	1	5
CSE451	Parallel and Distributed Systems	3	5	125	2	2	0	4
Pool of Circuits Elective Courses								
EPM311	Electric Circuits (2)	3	5	125	2	2	1	5
ECE311	Digital Circuits	3	5	125	2	2	1	5
CSE413	Digital Systems Testing and Verification	3	5	125	2	2	0	4
Pool of Control Elective Courses								
EPM371	Automatic Control Systems Design	3	5	125	2	2	1	5
CSE371	Control Engineering	3	5	125	2	2	0	4
Pool of Transmission and Communications Elective Courses								
EPM331	Electrical Power Transmission Systems	3	5	125	2	2	0	4

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
ECE351	Fundamentals of Communication Systems	3	5	125	2	2	0	4
Pool of Networks Elective Courses								
EPM333	Electrical Distribution Networks	3	4	100	2	2	0	4
ECE353	Telecommunication Networks	3	4	100	2	2	0	4
CSE351	Computer Networks	3	4	100	2	2	1	5
Pool of Embedded Systems Elective Courses								
EPM471	Microcontroller Applications in Power Engineering	3	5	125	2	2	1	5
CSE411	Real-Time Embedded Systems Design	3	5	125	2	2	1	5
Pool of Automation and Organization Elective Courses								
EPM472	Industrial Automation Systems	3	4	100	2	2	0	4
CSE312	Computer Organization	3	5	125	2	2	0	4

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

** The code for the Graduation Project (2) depends on the program, it is mentioned in the study plan or each program. Distribution of the contact hours may vary according to the program.

Civil Engineering Requirements

In addition to the Competencies for all Engineering Programs the BASIC CIVIL Engineering graduate must be able to (B-Level):

14. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.
15. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbours; or any other emerging field relevant to the discipline.
16. Plan and manage construction processes; address construction defects, instability, and quality issues; and maintain safety measures in construction and materials.
17. Deal with biddings, contracts and financial issues including project insurance and guarantees; and assess environmental impacts of civil engineering projects.

To achieve these Competencies, a set of courses must be completed as a Basic Civil Engineering Requirement.

Table 6 *List of Basic Civil Engineering Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
PHM212	Differential Equations for Civil Engineering*	2	4	100	2	1	0	2
CES211	Structural Mechanics (1)	4	6	150	3	2	0	5
CES212	Structural Mechanics (2)	3	5	125	2	2	0	4
CES221	Concrete Design (1)*	2	3	75	2	1	0	2
CES321	Concrete Design (2)*	2	4	100	2	1	0	2
CES323	Design of Concrete Floors and Halls	4	6	150	2	4	0	6
CES341	Design and Behavior of Steel Structures (1)	3	5	125	2	2	0	4
CES351	Concrete Technology	3	5	125	2	2	1	5
CES252	Materials Testing and Properties*	2	4	100	2	0	1	2
CES261	Geology and Geotechnical Engineering (1)	3	4	100	2	2	1	5
CES361	Geotechnical Engineering (2)	3	5	125	2	2	1	5
CEP211	Introduction to Plane Surveying	3	5	125	2	1	2	5
CEP212	Introduction to Topographical Surveying	3	5	125	2	2	1	5
CEP221	Highways and Transportation Engineering	3	5	125	2	2	0	4
CEI211	Fluid Mechanics	3	4	100	2	2	1	5
CEI212	Hydraulics	3	4	100	2	1	2	5
CEI231	Civil Drawing	2	4	100	1	3	0	4
CEI241	Engineering Hydrology*	2	4	100	2	1	0	2
DEP491	Graduation Project (2)**	3	4	100	2	2	0	4
-	Civil Engineering Elective (1)	3	5	125	2	2	0	4
-	Civil Engineering Elective (2)	3	5	125	2	2	0	4
Total		59	96	2400	42	37	10	84
Pool of Civil Engineering Elective (1) Courses								
CEP332	Highways Construction Material and Pavement Design	3	5	125	2	2	0	4
CES362	Foundation Engineering (1)	3	5	125	2	2	0	4
CES365	Foundation Engineering of Water Structures	3	5	125	2	2	0	4
CES461	Foundation Engineering (2)	3	5	125	2	2	0	4
Pool of Civil Engineering Elective (2) Courses								
CEP351	Water and Wastewater Networks	3	5	125	2	2	0	4
CEI321	Irrigation and Drainage Engineering	3	5	125	2	2	0	4

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.
** The code for the Graduation Project (2) depends on the program, it is mentioned in the study plan or each program. Distribution of the contact hours may vary according to the program.

Program 01: Design and Production Engineering Program 'MDPE'

Program Description

The Design and Production Engineering program prepares students for entry level professional practice in mechanical design and production engineering, both locally and internationally.

The Design and Production Engineering program is one of the oldest engineering programs in Egyptian universities. The program flourished with the boom in Egyptian industry during the sixties of the twentieth century. Recently, there is an increasing need for the modernization of industry in Egypt to cope with the global challenges of designing and producing cost effective products that can compete with the international market. Consequently, the Design and Production Engineering program has received due attention to be modernized. The program developed at Ain Shams University equip students with necessary competencies contemporary to the current industry. It also inspires graduates for self-learning to cope with the requirements of ever-changing career path after their graduation.

Career Prospects

Design and Production Engineering is one of the most recognized disciplines in Egyptian industry. Design and Production engineers are needed in many industries aiming to design and produce all kinds of products, machines and equipment. Graduates work in all industrial sectors including engineering, metallurgical, petrochemical, textiles, furniture, etc. They can work as engineers in research and development, operations management, quality control, tool design, work study, cost analysis, process control, heat treatment, etc.

Graduates can be specialized in a specific field of the following concentrations: Manufacturing engineering, Mechanical design, Industrial engineering and operations management, or Materials engineering.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☐ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☒ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☐ GOAL 11: Sustainable Cities & Communities	☒ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Design and Production Engineering Program graduate must be able to:

14. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.
15. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.
16. Select conventional mechanical equipment according to the required performance.
17. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.
18. Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products.
19. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings.
20. Implement basics of industrial engineering to analyse, plan and design production systems.
21. Select materials suitable for specific application.

Graduate Attributes

The graduates from Design and Production Engineering Program:

- Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products.
- Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings.
- Implement basics of industrial engineering to analyze, plan and design production systems.
- Select materials suitable for specific applications.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 7 *List of Design and Production Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	67	1675	24	26	21	71
	Mechanical Engineering Requirements	61	101	2525	47	25	13	85
MDP313	Mechanical System Design	3	5	125	2	2	1	5
MDP331	Operations Research	3	5	125	2	2	0	4
MDP431	Operations Management	4	6	150	3	2	0	5
MDP435	Work Study and Ergonomics	3	5	125	2	2	0	4
MDP471	Quality Control	3	5	125	2	2	0	4
MDP382	Theory of Metal Forming and Cutting	4	6	150	3	2	1	6
MDP481	Design of Tools and Production Facilities	2	3	75	2	1	0	3
MDP484	Materials Processing	2	4	100	2	0	1	3
MDP488	Metal Cutting Machines and Technology	4	7	175	3	1	2	6
-	MDPE Elective (1)	2	3	75	2	0	0	2
-	MDPE Elective (2)	3	5	125	2	2	0	4
-	MDPE Elective (3)	3	4	100	2	2	0	4
MDP492	MDPE Graduation Project (3)	2	6	150	0	0	6	6
Total		144	250	6250	111	69	45	225
Pool of MDPE Elective (1) Courses								

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
MDP314	Product Design and Development*	2	3	75	2	1	0	2
MDP333	Industrial Project Management*	2	3	75	2	1	0	2
MDP371	Quality Systems and Assurance*	2	3	75	2	1	0	2
Pool of MDPE Elective (2) Courses								
MDP411	Introduction to Finite Elements	3	5	125	2	2	0	4
MDP421	Advanced Topics in CNC Machine Tools	3	5	125	2	2	0	4
MDP433	Maintenance Planning and Scheduling	3	5	125	2	2	0	4
MDP437	Modeling and Simulation of Industrial Systems	3	5	125	2	2	0	4
MDP472	Lean Six Sigma	3	5	125	2	2	0	4
Pool of MDPE Elective (3) Courses								
MDP412	Noise and Vibration Control	3	5	125	2	2	0	4
MDP413	Selected Topics in Mechanical Design	3	5	125	2	2	0	4
MDP434	Advanced Manufacturing Systems	3	5	125	2	2	0	4
MDP436	Facilities Planning and Plant Layout	3	5	125	2	2	0	4
MDP438	Smart Manufacturing	3	5	125	2	2	0	4

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	3	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	27	
Semester (3)									
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
MDP211	Machine Construction	3	5	125	2	2	1	5	MDP111
MDP212	Mechanics of Materials	2	4	100	2	1	0	3	PHM131
MDP251	Structure and Properties of Materials	2	4	100	2	0	1	2	PHM141
MDP281	Manufacturing Technology	4	6	150	3	2	1	6	MDP181
MEP211	Thermal Physics	4	6	150	3	2	1	6	PHM112
Total		18	30	750	14	9	4	26	
Semester (4)									
MDP213	Mechanics of Machines	4	7	175	3	2	1	6	PHM132
MDP252	Metallurgy and Material Testing	3	4	100	2	1	2	5	MDP251
MEP212	Fluid Mechanics	4	6	150	3	2	1	6	PHM213
EPM214	Electrical Circuits and Machines	4	6	150	3	2	0	5	PHM122
CSE232	Fundamentals of Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		19	30	750	15	7	5	26	
Semester (5)									
MDP311	Machine Elements Design	4	6	150	2	2	3	7	MDP211 AND MDP212
MDP312	Mechanical Vibrations	3	5	125	2	2	1	5	PHM121 AND MDP213
MEP311	Heat Transfer	4	6	150	3	2	1	6	MEP211 AND MEP212
MCT331	Mechatronic systems integration	2	4	100	2	0	1	2	CSE232 AND MDP211
ECE212	Introduction to Electronics	2	4	100	2	1	0	2	PHM122
-	Measurements and Sensors Elective Course	3	5	125	3	0	0	3	
Total		18	30	750	14	7	6	25	
Semester (6)									

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
MDP313	Mechanical System Design	3	5	125	2	2	1	5	MDP311
MDP331	Operations Research	3	5	125	2	2	0	4	
MDP382	Theory of Metal Forming and Cutting	4	6	150	3	2	1	6	MDP281
MCT411	Hydraulics and Pneumatics Control	2	4	100	2	0	1	2	MEP212
-	General Mechanical Elective Course	3	5	125	2	2	0	4	
-	MDPE Elective (1)	2	3	75	2	0	0	2	
MDP391	MDPE Graduation Project (1)	1	2	50	0	2	0	2	MDP281
Total		18	30	750	13	10	3	25	
Semester (7)									
MDP431	Operations Management	4	6	150	3	2	0	5	
MDP435	Work Study and Ergonomics	3	5	125	2	2	0	4	
MDP488	Metal Cutting Machines and Technology	4	7	175	3	1	2	6	MDP281 AND MDP311
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	MDPE Elective (2)	3	5	125	2	2	0	4	
MDP491	MDPE Graduation Project (2)	2	4	100	1	2	0	3	MDP391
Total		18	30	750	13	9	2	24	
Semester (8)									
MDP432	Engineering Economy	2	3	75	2	1	0	2	
MDP471	Quality Control	3	5	125	2	2	0	4	PHM113
MDP481	Design of Tools and Production Facilities	2	3	75	2	1	0	2	MDP382
MDP484	Materials Processing	2	4	100	2	0	1	2	MDP281
-	Mechanical Control Elective Course	3	5	125	2	2	0	4	
-	MDPE Elective (3)	3	4	100	2	2	0	4	
MDP492	MDPE Graduation Project (3)	2	6	150	0	0	6	6	MDP491
Total		17	30	750	12	8	7	24	

* Only if applicable according to regulations announced by the Faculty council based on article (15).

Figure 1 Course Tree for 'Design and Production Engineering' Program

Program 02: Mechanical Power Engineering Program 'MEPE'

Program Description

The program is commissioned to provide an engineer that works in the field of power supply to industry and domestic needs in addition to the energy utilization and conversion into forms that are liable for assisting the human activity as well as for providing human comfort. All Factories and corporations in the industry urgently need powerful schemes of managing their power supplies and operate their equipment in a highly efficient form of energy utilization. The program is thus devoted to the study of the nature and behaviour of thermo-fluids. Topics of courses cover the technology of energy release, conversion and efficient use. Applications involve the forms of mass and energy delivery and their transport phenomena. Smart management and legal non-harmful use of energy require the employment of automatic control methodology as well as the pollution reduction techniques.

Career Prospects

The graduate of the program is expected to get a job in one of the following fields:

1. Power generation
2. Refrigeration and Air Conditioning
3. Oil and Gas industry
4. Food, Paper, and Textile processing
5. Water Desalination and Distillation
6. Jet engines and rocket propulsion
7. Heavy equipment - Hydraulic and Pneumatic machines

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☒ GOAL 6: Clean Water & Sanitation
☒ GOAL 7: Affordable & Clean Energy	☐ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☐ GOAL 11: Sustainable Cities & Communities	☒ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Mechanical Power Engineering Program graduate must be able to:

14. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.
15. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.
16. Select conventional mechanical equipment according to the required performance.
17. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.
18. Apply knowledge of engineering principles and transport phenomena to the solution of complex problems in the broader energy domain and its associated services, processes, and products.
19. Select and apply analytical and computational techniques to analyze and/or model complex problems to reach substantiated conclusions using engineering principles, while recognizing the limitations of the technique employed.
20. Design integrated solutions for complex mechanical power engineering problems and their associated services, products, and processes that meet a combination of societal, user, business, and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental, and commercial matters, codes of practice, and industry standards.
21. Evaluate the environmental and societal impact of solutions to complex problems in the energy domain and minimize their adverse impacts.
22. Use practical laboratory and workshop skills to investigate combustion, heat engine, turbomachinery, and refrigeration problems, which involve a variety of factors that may impose conflicting constraints but can be solved by the application of engineering science and well-proven analysis techniques.
23. Select and apply appropriate materials, equipment, engineering technologies, and processes that concern combustion, heat engine, turbomachinery, and refrigeration problems and their associated services, products, and processes.
24. Apply knowledge of engineering management principles, commercial context, and project management related to the mechanical power engineering field.
25. Identify and assess energy conversion, energy storage, energy efficiency, and their associated processes and control to achieve affordable and clean energy, clean water, and Industry Innovation.

Graduate Attributes

The graduates from Mechanical Power Engineering Program:

- Model, analyse, and design heat engines, refrigeration systems and turbomachines, and apply the concepts of thermodynamics, heat transfer, design, and fluid mechanics.
- Design and control various mechanical systems using traditional means and computer-aided tools and software.
- Design energy systems considering energy conversion, energy storage, energy efficiency, and economics.
- Show professional and ethical responsibilities and contextual understanding.
- Engage in self-learning and long-life learning methods.
- Apply the basic industrial safety measures to projects and processes.
- Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.

- Work effectively within multi-disciplinary teams and communicate effectively.
- Consider the impacts of engineering solutions on society & environment.
- Apply and integrate knowledge, understanding, and skills of different subjects and available computer software to solve real problems in industries and power stations.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 8 *List of Mechanical Power Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	67	1675	24	26	21	71
	Mechanical Engineering Requirements	61	101	2525	46	27	13	86
MEP312	Combustion	3	5	125	2	2	1	5
MEP411	Thermal Power Plants	3	5	125	2	2	1	5
MEP412	Internal Combustion Engines	3	4	100	2	2	1	5
MEP321	Incompressible Flow Machines	3	6	150	2	2	1	5
MEP421	Sustainable Energy Systems and Technology	4	6	150	3	2	0	5
MEP431	Refrigeration	3	4	100	2	2	1	5
MEP432	Compressible Flow Machines	3	6	150	2	2	1	5
MEP433	Air Conditioning	3	5	125	2	2	1	5
MEP434	Digital and Process Control	4	6	150	3	1	2	6
MEP435	Fundamentals of Computational Thermofluids	3	5	125	2	2	0	4
-	MEPE Elective (1)	2	4	100	2	0	0	2
-	MEPE Elective (2)	2	4	100	2	0	0	2
MEP492	MEPE Graduation Project (3)	2	4	100	1	0	3	4
Total		144	250	6250	110	72	46	228
Pool of MEPE Elective (1) Courses								
MEP413	Advances in Internal Combustion Engines*	2	4	100	2	0	1	2
MEP414	Biomass Systems and Energy Storage*	2	4	100	2	1	0	2
MEP416	Solar and Wind Energy Systems*	2	4	100	2	1	0	2
MEP417	Heat Engines*	2	4	100	2	1	0	2
MEP443	Selected Topics in Mechanical Power Engineering (1)*	2	4	100	2	1	0	2
MEP451	Nuclear Energy*	2	4	100	2	1	0	2
Pool of MEPE Elective (2) Courses								
MEP415	Propulsion for Modern Transport Systems*	2	4	100	2	1	0	2
MEP422	Advanced Energy Conversion*	2	4	100	2	1	0	2
MEP423	Water Desalination and Distillation*	2	4	100	2	1	0	2
MEP436	Building Services Engineering*	2	4	100	2	1	0	2
MEP437	Water Distribution Networks*	2	4	100	2	1	0	2
MEP442	Environmental Impact Assessment*	2	4	100	2	1	0	2
MEP444	Selected Topics in Mechanical Power Engineering (2)*	2	4	100	2	1	0	2

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	

	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
MDP211	Machine Construction	3	5	125	2	2	1	5	MDP111
MDP212	Mechanics of Materials	2	4	100	2	1	0	2	PHM131
MDP251	Structure and Properties of Materials	2	4	100	2	0	1	2	PHM141
MDP281	Manufacturing Technology	4	6	150	3	2	1	6	MDP181
MEP211	Thermal Physics	4	6	150	3	2	1	6	PHM112
Total		18	30	750	14	9	4	25	
Semester (4)									
MDP213	Mechanics of Machines	4	7	175	3	2	1	6	PHM132
MDP252	Metallurgy and Material Testing	3	4	100	2	1	2	5	MDP251
MEP212	Fluid Mechanics	4	6	150	3	2	1	6	PHM213
EPM214	Electrical Circuits and Machines	4	6	150	3	2	0	5	PHM122
CSE232	Fundamentals of Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		19	30	750	15	7	5	26	
Semester (5)									
MDP311	Machine Elements Design	4	6	150	2	2	3	7	MDP211 AND MDP212
MDP312	Mechanical Vibrations	3	5	125	2	2	1	5	PHM121 AND MDP213
MEP311	Heat Transfer	4	6	150	3	2	1	6	MEP211 AND MEP212
MCT331	Mechatronic Systems Integration	2	4	100	2	0	1	2	CSE232 AND MDP211
ECE212	Introduction to Electronics	2	4	100	2	1	0	2	PHM122
-	Measurements and Sensors Elective Course	3	5	125	2	2	0	4	
Total		18	30	750	13	9	6	26	
Semester (6)									
MEP312	Combustion	3	5	125	2	2	1	5	MEP311
MEP321	Applied Thermodynamics	3	5	125	2	2	1	5	MEP211
MEP331	Incompressible Flow Machines	3	6	150	2	2	1	5	MEP212
MCT411	Automatic Control	3	5	125	2	2	1	5	PHM213
ASUx31	Hydraulics and Pneumatics Control	2	4	100	2	0	1	2	MEP212
-	Graduation Thesis	2	3	75	2	0	0	2	
MEP391	MEPE Graduation Project (1)	1	2	50	0	2	0	2	
Total		17	30	750	12	10	5	26	
Semester (7)									
MEP411	Thermal Power Plants	3	5	125	2	2	1	5	MEP311 and MEP313
MEP412	Internal Combustion Engines	3	4	100	2	2	1	5	MEP312 AND MEP313
MEP431	Refrigeration	3	4	100	2	2	1	5	MEP311 AND MEP313
MEP432	Compressible Flow Machines	3	6	150	2	2	1	5	MEP212 AND MEP311
MEP441	Project Management and Engineering Economy	2	3	75	2	0	0	2	MEP311
-	MEPE Elective (1)	2	4	100	2	1	0	2	
MEP491	MEPE Graduation Project (2) MEPE	2	4	100	1	2	0	3	MEP311 AND MEP391
Total		18	30	750	13	11	4	27	
Semester (8)									
MEP421	Sustainable Energy Systems and Technology	4	6	150	3	2	0	5	MEP311
MEP433	Air Conditioning	3	5	125	2	2	1	5	MEP311 AND MEP313
MEP434	Digital and Process Control	4	6	150	3	1	2	6	MEP331
MEP435	Fundamentals of Computational Thermofluids	3	5	125	2	2	0	4	MEP311
-	MEPE Elective (2)	2	4	100	2	1	0	2	

	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
MEP492	MEPE Graduation Project (3)	2	4	100	1	0	3	4	MEP491
Total		18	30	750	13	8	6	26	

* Only if applicable according to regulations announced by the Faculty council based on article (15).

Figure 2 Course Tree for 'Mechanical Power Engineering' Program

Program 03: Automotive Engineering Program 'AUTO'

Program Description

The automotive engineering program will equip the students with the knowledge and skills required to the needs in the advanced areas of automotive industry both locally and globally. The program is designed to meet the great advancements in the fields of vehicle design, dynamics, powertrain, control systems and maintenance engineering. The automotive industry is one of the key industries that boosts economies for developing and developed countries.

Career Prospects

Automotive engineering career opportunities are increasingly in high demand for both individual mobility and transportation of goods and people. The potential careers in vehicle design are expanding specially for the automotive assembly feeding industries. The emerging companies that works on automotive intelligence and control systems are expanding and Egypt is becoming one of the main hubs for automotive embedded systems that is acquiring more automotive engineers with the right skills. With the environmental challenges and new trends for automotive powered systems, engineers with good computational methods and software packages skills as well as practical testing knowledge are globally and locally in demand for new technologies validation and verification. With the growth of the number of cars, the maintenance engineering for automotive careers will be always needed for passenger, commercial and earth moving equipment. Finally, there will be always a chance for race cars enthusiasts to pursue their careers knowing that Ain Shams University participates annually in multiple international car racing events such as Formula Student.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☐ GOAL 6: Clean Water & Sanitation
☒ GOAL 7: Affordable & Clean Energy	☐ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☐ GOAL 11: Sustainable Cities & Communities	☒ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Automotive Engineering Program graduate must be able to:

14. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing,

Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

15. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.
16. Select conventional mechanical equipment according to the required performance.
17. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.
18. Identify and discuss vehicles as complex systems from technical and social perspectives through a broad platform in automotive engineering.
19. Analyse new technical challenges and create technical advancements in the automotive industry in four focus areas: powertrain, performance, autotronics and maintenance.
20. Synthesize and evaluate automotive systems and products in terms of direct use and lifecycle analysis and take environmental and economic aspects into consideration.
21. Utilize automotive-related IT and product development tools.
22. Demonstrate the skills needed to manage and contribute to team-based engineering activities and projects in a multi-discipline environment through application and practice.

Graduate Attributes

The graduates from Automotive Engineering Program:

- Master a wide spectrum of automotive engineering knowledge and specialized skills, specifically in the realm of environmental aspects and sustainability, and can apply acquired knowledge using theories and abstract thinking in real-life situations.
- Apply analytic critical and systemic thinking to identify, diagnose, and solve automotive engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to automotive engineering and sustainability ethics and standards.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Recognize his/her role in promoting the automotive engineering field and contribute to the development of the architecture profession and the community.
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Use techniques, skills, and modern engineering tools necessary for automotive engineering practice. In addition to applying his/her own knowledge and practical skills to create and develop automotive designs starting from the briefing phase till beyond the construction and operating phase.
- Assume full responsibility for own learning and self-development, engage in lifelong learning, and demonstrate the capacity to engage in post-graduate and research studies.
- Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- Demonstrate leadership qualities, business and project administration, and entrepreneurial skills.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 9 *List of Automotive Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	67	1675	24	26	21	71
	Mechanical Engineering Requirements	61	101	2525	47	24	14	85
MEA411	Electric Vehicles Technology*	2	4	100	2	1	0	2
MEA412	Road Vehicle Dynamics	3	5	125	2	2	0	4
MEA321	Vehicle Design and Simulation (1)	3	5	125	2	1	2	5
MEA421	Vehicle Design and Simulation (2)	3	5	125	2	1	2	5
MEA431	Automotive Maintenance Engineering	3	4	100	2	0	3	5
MEA433	Automotive After Sales Services*	2	4	100	2	1	0	2
MEA341	Automotive Engines and Fuel Systems	4	6	150	3	0	3	6
MEA442	Computer Aided Design of Automotive Engines	3	5	125	2	0	3	5
MEA451	Automotive Mechatronic Systems	3	5	125	2	1	3	5
MEA452	Vehicle Safety Systems and Accident Analysis*	2	4	100	2	0	1	2
-	AUTO Elective (1)	3	5	125	2	2	0	4
-	AUTO Elective (2)	2	3	75	1	2	0	3
-	AUTO Elective (3)	3	5	125	2	2	0	4
MEA492	AUTO Graduation Project (3)	2	4	100	1	2	0	3
Total		144	250	6250	111	65	52	224
Pool of AUTO Elective (1) Courses								
MEA414	Earth Moving Equipment and Commercial Vehicle Technology	3	5	125	2	2	0	4
MEA415	Race Car Technology	3	5	125	2	1	2	5
MEA434	Workshop Planning and Vehicle Repair Technologies	3	5	125	2	0	3	5
CSE311	Logic Circuits	3	5	125	2	2	0	4
CSE412	Embedded Systems	3	5	125	2	2	1	5
Pool of AUTO Elective (2) Courses								
MEA413	Aerodynamics of Road Vehicles*	2	3	75	2	1	0	2
MEA443	Alternative Fuels and Emissions Control Systems*	2	3	75	2	1	0	2
MEA444	Powertrain Characterization and Automotive Testing Standards*	2	3	75	2	0	1	2
MEA453	Automotive Control Systems*	2	3	75	2	0	1	2
MEA461	Vehicle Manufacturing and Assembly*	2	3	75	2	1	0	2
Pool of AUTO Elective (3) Courses								
MEA416	Motorcycle and Tricycle Technology	3	5	125	2	1	2	5
MEA441	Engine Management Systems	3	5	125	2	0	3	5
MDP471	Quality Control	3	5	125	2	2	0	4
MEP313	Applied Thermodynamics	3	5	125	2	2	1	5
MCT453	Embedded Systems for Automotive	3	5	125	2	2	1	5

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
MDP211	Machine Construction	3	5	125	2	2	1	5	MDP111
MDP212	Mechanics of Materials	2	4	100	2	1	0	2	PHM131
MDP251	Structure and Properties of Materials	2	4	100	2	0	1	2	PHM141
MDP281	Manufacturing Technology	4	6	150	3	2	1	6	MDP181
MEP211	Thermal Physics	4	6	150	3	2	1	6	PHM112
Total		18	30	750	14	9	4	25	
Semester (4)									
MDP213	Mechanics of Machines	4	7	175	3	2	1	6	PHM132
MDP252	Metallurgy and Material Testing	3	4	100	2	1	2	5	MDP251
MEP212	Fluid Mechanics	4	6	150	3	2	1	6	PHM213
EPM214	Electrical Circuits and Machines	4	6	150	3	2	0	5	PHM122
CSE232	Fundamentals of Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		19	30	750	15	7	5	26	
Semester (5)									
MDP311	Machine Elements Design	4	6	150	2	2	3	7	MDP211 AND MDP212
MDP312	Mechanical Vibrations	3	5	125	2	2	1	5	PHM121 AND MDP213
MEP311	Heat Transfer	4	6	150	3	2	1	6	MEP211 AND MEP212
MCT331	Mechatronic systems integration	2	4	100	2	0	1	2	CSE232 AND MDP211
ECE212	Introduction to Electronics	2	4	100	2	1	0	2	PHM122
-	Measurements and Sensors Elective Course	3	5	125	2	2	0	4	
Total		18	30	750	13	9	6	26	
Semester (6)									
MEA321	Vehicle Design and Simulation (1)	3	5	125	2	1	2	5	MDP311
MEA341	Automotive Engines and Fuel Systems	4	6	150	3	0	3	6	MEP211
MCT411	Hydraulics and Pneumatics Control	2	4	100	2	0	1	2	MEP212
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
MEA311	Automotive Engineering	3	5	125	2	2	0	4	
-	Mechanical Control Elective Course	3	5	125	2	2	0	4	
MEA391	AUTO Graduation Project (1)	1	2	50	0	2	0	2	
Total		18	30	750	13	7	6	25	
Semester (7)									
MEA411	Electric Vehicles Technology	2	4	100	2	1	0	2	MEA311
MEA412	Road Vehicle Dynamics	3	5	125	2	2	0	4	MDP312
MEA421	Vehicle Design and Simulation (2)	3	5	125	2	1	2	5	MEA321
MEA431	Automotive Maintenance Engineering	3	4	100	2	0	3	5	MEA341
-	AUTO Elective (1)	3	5	125	2	2	0	4	
-	AUTO Elective (2)	2	3	75	1	2	0	3	
MEA491	AUTO Graduation Project (2)	2	4	100	1	2	0	3	MEA391
Total		18	30	750	12	10	5	26	
Semester (8)									
MEA432	Project Management for Mechanical Engineering	2	3	75	2	1	0	2	
MEA433	Automotive After Sales Services	2	4	100	2	1	0	2	MEA431
MEA442	Computer Aided Design of Automotive Engines	3	5	125	2	0	3	5	MDP311 AND MEA341
MEA451	Automotive Mechatronic Systems	3	5	125	2	1	2	5	CSE232 AND MEA311
MEA452	Vehicle Safety Systems and Accident Analysis	2	4	100	2	0	1	2	MEA321
-	AUTO Elective (3)	3	5	125	2	2	0	4	
MEA492	AUTO Graduation Project (3)	2	4	100	1	2	0	3	MEA491
Total		17	30	750	13	7	6	23	

* Only if applicable according to regulations announced by the Faculty council based on article (15).

Figure 3 Course Tree for 'Automotive Engineering' Program

Program 04: Mechatronics and Robotics Engineering Program 'MCTR'

Program Description

The Mechatronics and Robotics engineering program is a multidisciplinary field of science that includes a combination of mechanical engineering, Electronics, computer engineering. This program is capable to enrich the student's basic theoretical and practical knowledge of mechatronics system components, and design methodologies of mechatronics systems.

Career Prospects

The graduate of the program is expected to get a job in one of the following positions:

1. Embedded systems
2. Projects using Heavy earthmoving equipment and hydraulic and pneumatic machines,
3. Sales engineer for robotics and automation,
4. automated manufacturing and production systems,
5. Control engineer,
6. Maintenance engineer,
7. Robotics and automation industry.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☒ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☐ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☒ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☐ GOAL 11: Sustainable Cities & Communities	☒ GOAL 12: Responsible Consumption & Production
☐ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Mechatronics and Robotics Engineering Program graduate must be able to:

14. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

15. Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.
16. Select conventional mechanical equipment according to the required performance.
17. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.
18. Illustrate the basic concepts and theories of mathematics, sciences, engineering projection and their applications within the field of mechatronics engineering.
19. Analyse mechatronic system using scientific, mathematical and computer-based models and asses the limitations of particular cases.
20. Identify and classify the performance of mechatronic systems and components through the use of analytical methods and Modeling techniques.
21. Interpret experimental and other numerical input/output data from dynamic systems.
22. Design a mechatronic system using systems approach to meet a given specification and requirements.
23. Integrate a wide range of analytical tools, techniques, equipment, and software packages to design and develop mechatronic systems.
24. Exercise creative approaches to the analysis and solution of problems in mechatronic engineering.

Graduate Attributes

The graduates from Mechatronics and Robotics Engineering Program:

- Master a wide spectrum of Mechatronics engineering knowledge and specialized skills, and can apply acquired knowledge using theories and abstract thinking in real life situations.
- Apply analytic critical and systemic thinking to identify, diagnose and solve Mechatronics engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to Mechatronics engineering and sustainability ethics and standards.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Recognize his/her role in promoting the Mechatronics engineering field and contribute in the development of the Mechatronics profession and the community;
- Value the importance of the environment, and apply the principles of sustainable system design and development for mechatronic systems.
- Use techniques, skills, and modern engineering tools necessary for Mechatronics engineering practice. In addition to applying his/her own knowledge and practical skills to create and develop mechatronics systems designs starting from the briefing phase till beyond the construction and operating phase.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- Demonstrate leadership qualities, business and project administration and entrepreneurial skills.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 10 *List of Mechatronics and Robotics Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	67	1675	24	26	21	71
	Mechanical Engineering Requirements	61	101	2525	47	25	14	86
MCT413	Control Systems Design (2)	3	3	75	2	2	1	5
MCT412	Industrial Automation and Networks	3	5	125	2	1	2	5
MCT342	Industrial Robotics	3	5	125	2	2	1	5
MCT344	Mechatronic Systems Design	2	4	100	1	1	2	4
EPM454	Power Electronics and Electrical Drives Systems	4	5	125	3	2	1	5
ECE313	Electronic for Instrumentations*	2	4	100	2	1	0	2
ECE251	Signals and Systems Fundamentals	3	5	125	2	2	0	4
CSE311	Logic Circuits	3	5	125	2	2	0	4
CSE412	Embedded Systems	3	5	125	2	2	1	5
CSE339	Advanced Programming*	2	4	100	2	0	1	2
CSE474	Fundamentals of Computational Intelligence*	2	4	100	2	1	0	2
CSE475	Machine Vision*	2	4	100	2	1	0	2
-	MCTR Elective (1)	3	5	125	2	0	3	5
-	MCTR Elective (2)	3	5	125	2	0	3	5
MCT493	MCTR Graduation Project (3)	3	5	125	0	6	0	6
Total		147	254	6350	112	74	50	231
Pool of MCTR Elective (1) and Elective (2) Courses								
MDP411	Introduction to Finite Elements	3	5	125	2	2	1	5
MCT442	Advanced Robotics Analysis and Control	3	5	125	2	2	1	5
MCT444	Introduction to MEMS Design	3	5	125	2	2	1	5
MCT451	Autotronics	3	5	125	2	2	1	5
MCT452	Biomechatronics	3	5	125	2	2	1	5
MCT453	Embedded Systems for Automotive	3	5	125	2	2	1	5
MCT461	Selected Topics in Mechatronic Engineering	3	5	125	2	2	0	4
CSE472	Digital Image Processing	3	5	125	2	2	0	4

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041 AND PHM011
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
MDP211	Machine Construction	3	5	125	2	2	1	5	MDP111
MDP212	Mechanics of Materials	2	4	100	2	1	0	2	PHM131
MDP251	Structure and Properties of Materials	2	4	100	2	0	1	1	PHM141
MDP281	Manufacturing Technology	4	6	150	3	2	1	6	MDP181
MEP211	Thermal Physics	4	6	150	3	2	1	6	PHM112
Total		18	30	750	14	9	4	24	
Semester (4)									
MDP213	Mechanics of Machines	4	7	175	3	2	1	6	PHM132
MDP252	Metallurgy and Material Testing	3	4	100	2	1	2	5	MDP251
MEP212	Fluid Mechanics	4	6	150	3	2	1	6	PHM213
EPM214	Electrical Circuits and Machines	4	6	150	3	2	0	5	PHM122
CSE232	Fundamentals of Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		19	30	750	15	7	5	26	
Semester (5)									
MDP311	Machine Elements Design	4	6	150	2	2	3	7	MDP211 AND MDP212
MDP312	Mechanical Vibrations	3	5	125	2	2	1	5	PHM121 AND MDP213
MCT331	Mechatronic systems integration	2	4	100	2	0	1	2	CSE232 AND MDP211
ECE212	Introduction to Electronics	2	4	100	2	1	0	2	PHM122
ECE251	Signals and Systems Fundamentals	3	5	125	2	2	0	4	PHM213
CSE339	Advanced Programming	2	4	100	2	0	1	2	CSE232
-	Measurements and Sensors Elective Course	3	5	125	2	2	0	4	
Total		19	33	825	14	9	6	26	
Semester (6)									
MCT342	Industrial Robotics	3	5	125	2	2	1	5	MDP213
MCT344	Mechatronic Systems Design	2	4	100	1	1	2	4	MCT331
MEP311	Heat Transfer	4	6	150	3	2	1	6	MEP211 AND MEP212
ECE313	Electronic for Instrumentations	2	4	100	2	1	0	3	ECE212
CSE311	Logic Circuits	3	5	125	3	1	0	4	
MCT311	Control Systems Design (1)	3	5	125	2	2	1	5	PHM213 AND MDP312
MCT391	MCTR Graduation Project (1)	1	2	50	0	0	2	2	
Total		18	31	775	13	9	7	29	
Semester (7)									
MCT411	Hydraulics and Pneumatics Control	2	4	100	2	0	1	2	MEP212
MCT412	Industrial Automation and Networks	3	5	125	2	1	2	5	CSE311
MCT413	Control Systems Design (2)	3	3	75	2	2	1	5	MCT311
EPM454	Power Electronics and Electrical Drives Systems	4	5	125	3	2	1	6	EPM214
CSE412	Embedded Systems	3	5	125	2	2	1	5	CSE232
CSE475	Machine Vision	2	4	100	2	1	0	2	ECE251
MCT491	MCTR Graduation Project (2)	2	4	100	1	2	0	3	MCT391
Total		19	30	750	14	10	6	28	
Semester (8)									
MDP333	Industrial Project Management	2	3	75	2	1	0	2	
CSE474	Fundamentals of Computational Intelligence	2	4	100	2	1	0	2	PHM113
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	General Mechanical Elective Course	3	5	125	2	2	0	4	
-	MCTR Elective (1)	3	5	125	2	0	3	5	
-	MCTR Elective (2)	3	5	125	2	0	3	5	
MCT493	MCTR Graduation Project (3)	3	5	125	0	6	0	6	MCT492
Total		18	30	750	12	10	6	26	

* Only if applicable according to regulations announced by the Faculty council based on article (15).

Figure 4 Course Tree for 'Mechatronics and Robotics Engineering' Program

Program 05: Architectural Engineering Program 'ARCH'

Program Description

Throughout history, architecture was witness to the most significant reflections of culture and civilization. In today's world, architects are compelled to challenge critical global issues through holding responsibility of the built environment, responding to societal needs and conserving natural resources. The program is committed to offering well-rounded future generations of skilled professional architects through an education that is rooted in culture, sustained with theory and progressive with technologically advanced methods. This program is dedicated to sustain creativity with knowledge and practice.

Career Prospects

It is intended that graduates of the Architectural Engineering program will acquire critical thinking and enhance design creativity in order to take a leading role in the professional practice. Graduates will be eligible to work in architectural design firms; in design, tender documents, as well as urban design and detailed planning. Moreover, they will be qualified for working in construction industry, building technology, rehabilitation, conservation of buildings, urban context, and physical planning. Additionally, they can be enrolled in graduate studies in universities or research centres.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☒ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☐ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☒ GOAL 8: Decent Work & Economic Growth	☐ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☐ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

The program of Architectural engineering encourages undergraduate students, in the beginning of Level 4, to participate in one of four concentrations responding to the professional demands:

1. Architecture.
2. Building Technology.
3. Urban Design.
4. Urban Planning.

These concentrations develop abilities and specialized skills that would serve students in the workplace and beyond. The concentrations require that the student has passed compulsory and elective courses in levels 1, 2 and 3 along with the prerequisite courses needed. Students will be addressed 8 credit hours "Graduation Project".

1. Architecture Concentration: The Architecture Concentration allows students to develop a comprehensive broad understanding of the concepts and methods for advanced design, technical and professional aspects of design of built environments.

2. Building Technology Concentration: The Building Technology Concentration introduces students to building science and technologies. It enables them to develop an understanding of building performance requirements and building construction process; starting from the design development phase and ending with the preparation phase of tender documents.
3. Urban Design Concentration: The Urban Design concentration main goal is to apply innovations to reform urban design practice to meet the dynamic new urban problems. This Concentration allows students to have a well-developed understanding of urban places and the inter-dependencies of the fabric of buildings, landscapes, public ways, social interactions and the environmental context that shape them.
4. Urban Planning Concentration: Urban planning Concentration aims to broaden students' appreciation of planning and urban theory whilst providing them with the necessary skills to engage in critical and creative problem-solving and to think critically in analytical ways across the different city scales, from strategic to local. This concentration allows students to explore international practices in urban development policy, planning and management that address contemporary spatial, socio-economic and political transformations in cities.

Agreements with another University

The program is in partnership with Mediterranea University of Reggio Calabria (UNIRC), Italy for a Master Degree of Architecture. Students joining this agreement will pay an additional fee, to substitute expenses for the study, advising and coordination that will take place in Italy during the last semester(s) in Italy in addition to other semester(s) in Egypt. The Graduates should receive one B.Sc. certificate from ASU, and M.Sc. from Mediterranea University of Reggio Calabria.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Architectural Engineering Program graduate must be able to:

14. Create architectural, urban and planning designs that satisfy both aesthetic and technical requirements, using adequate knowledge of: history and theory, related fine arts, local culture and heritage, technologies and human sciences.
15. Produce designs that meet building users' requirements through understanding the relationship between people and buildings, and between buildings and their environment; and the need to relate buildings and the spaces between them to human needs and scale.
16. Generate ecologically responsible, environmental conservation and rehabilitation designs; through understanding of: structural design, construction, technology and engineering problems associated with building designs.
17. Transform design concepts into buildings and integrate plans into overall planning within the constraints of: project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations and procedures involved.
18. Prepare design project briefs and documents; and understand the context of the architect in the construction industry, including the architect's role in the processes of bidding, procurement of architectural services and building production.
19. Apply digital architecture software to produce, render, and present in design.
20. Demonstrate deep understanding of the advanced construction materials, methods and techniques.
21. Recognize different design methods and approaches.
22. Identify contemporary housing problems and apply polices, and designs.
23. Apply advanced lighting, acoustics, and smart systems techniques in design.

24. Demonstrate additional abilities related to the field of the concentration within Architectural Engineering as listed below.

Concentration	Competence
Architecture	24a. Demonstrate comprehensive ability to design innovative architectural projects based on the most contemporary trends and theories of architecture. 24b. Apply digital technologies and software as design aiding tools to generate parametrically designed sophisticated architectural forms and Information Modeling in design.
Building Technology	24c. Demonstrate comprehensive ability to design architectural buildings of sophisticated technical systems and advanced/mega structure systems. 24d. Apply digital technologies and software as design evaluation and optimizing tools for architectural buildings. 24e. Produce a full set of tender documents for complex projects. 24f. Demonstrate an understanding of the buildings rehabilitation process needs and procedures.
Urban Design	24g. Demonstrate comprehensive ability to design urban projects that exist in thematic/heritage context with deep responsiveness to environmental issues and problems that face the society and built areas. 24h. Apply digital technologies and software as urban design aiding tools for geo/spatial Information Modeling and analysing. 24i. Solve the urban mobility that serve urban context that ensure its sustainability.
Urban Planning	24j. Demonstrate comprehensive ability to analyse and solve the urban planning problems with the necessary skills to engage in critical and creative problem-solving. 24k. Solve conflicts between the engineering systems that serve urban context and its urban values. 24l. Demonstrate understanding of the economic forces of urban context and its dynamics

Graduate Attributes

The graduates from Architectural Engineering Program:

- Master a wide spectrum of architectural engineering knowledge and specialized skills, specifically in the realm of environmental aspects and sustainability and can apply acquired knowledge using theories and abstract thinking in real life situations.
- Apply analytic critical and systemic thinking to identify, diagnose and solve architectural engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to architectural engineering and sustainability ethics and standards;
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance;
- Recognize his/her role in promoting the architectural engineering field and contribute in the development of the architecture profession and the community;
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles;
- Use techniques, skills and modern engineering tools necessary for architectural engineering practice. In addition to applying his/her own knowledge and practical skills to create and develop architectural designs starting from the briefing phase till beyond the construction and operating phase.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies;
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner;

- Demonstrate leadership qualities, business and project administration and entrepreneurial skills.

Admission Policy

To maintain the quality and excellency of the "Architectural Engineering Program", the candidate students applying to the program, either Freshman students who have passed Level 1, or Sophomores transferred from other programs, should qualify to the program needs.
Passing the course of "Projection and Engineering Graphics" is a must for all applicant students. These students should also successfully pass an aptitude test that indicates their validity and ability to join the program. This exam will be assessed blindly by a jury of professors of architecture. The exam will evaluate the following skills and talents for each student:

1. The Imagination skills.
2. The ability to express visually.
3. The ability to read images.
4. The ability to think creatively.
5. The ability to read and conduct basic and simple architectural drawings.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 11 *List of Architectural Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	24	26	20	70
	Architectural Engineering Requirements	67	113	2825	35	70	3	108
	Concentration Courses	32	53	1325	18	28	0	46
Total		144	250	6250	90	124	23	237
Pool of Architecture 'AD' Concentration Courses								
ARC411	Architecture and Dwelling Studio	3	6	150	1	4	0	5
ARC412	Thematic Design Studio	3	6	150	1	4	0	5
ARC421	Theory and Philosophy of Contemporary Architecture	2	3	75	2	0	0	2
ARC422	Human Aspects in Architecture	2	3	75	2	0	0	2
ARC441	Computational Design in Architecture	3	5	125	1	4	0	5
ARC451	Interior Design and Technical Drawings Studio	3	5	125	1	4	0	5
ARC461	Acoustics in Architecture*	2	3	75	2	1	0	2
-	ARCH Elective (1) AD & BT**	2	3	75	2	0	0	2
-	ARCH Elective (2) AD & BT	3	3	75	3	0	0	3
-	ARCH Elective (3) AD & BT	3	3	75	3	0	0	3
ARC492	ARCH Graduation Project (3) AD & BT	6	13	325	0	12	0	12
Pool of Building Technology 'BT' Concentration Courses								
ARC413	Architectural Sustainable Rehabilitation Design Studio	4	7	175	2	5	0	7
ARC421	Theory and Philosophy of Contemporary Architecture	2	3	75	2	0	0	2
ARC431	Principles of Residential Development	2	3	75	2	0	0	2
ARC441	Computational Design in Architecture	3	5	125	1	4	0	5
ARC443	Building Performance Simulation	3	5	125	1	4	0	5
ARC452	Working Design (2): Blow Ups Detailing and BOQs	3	6	150	1	4	0	5
ARC453	Advanced Technical Installation*	2	4	100	2	1	0	2
ARC461	Acoustics in Architecture*	2	3	75	2	1	0	2
-	ARCH Elective (1) AD & BT**	2	3	75	2	0	0	2
-	ARCH Elective (2) AD & BT	3	3	75	3	0	0	3
-	ARCH Elective (3) AD & BT	3	3	75	3	0	0	3
ARC492	ARCH Graduation Project (3) AD & BT	6	13	325	0	12	0	12
Pool of ARCH Elective (2) & (3) AD & BT Courses								
ARC423	Architecture and Environmental Psychology	3	3	75	2	2	0	4
ARC424	Architectural Criticism and Project Evaluation	3	5	125	2	2	0	4
ARC425	Identity and Contemporaneity in Egyptian Architecture	3	3	75	2	2	0	4

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
ARC426	Built Environment Accessibility	3	5	125	2	2	0	4
ARC432	Architectural Heritage	3	3	75	2	2	0	4
ARC454	Earth Construction	3	3	75	2	2	0	4
ARC462	Sustainable Building Rating Systems	3	4	100	2	2	0	4
ARC463	Renewable Energy and Buildings	3	3	75	2	2	0	4
ARC471	Facilities Management	3	3	75	2	2	0	4
ARC472	Building Life Cycle Assessment	3	5	125	2	2	0	4
ARC467	Design for Climate Change	3	4	100	2	2	0	4
UPL461	Environmental Impact Assessment	3	4	100	2	2	0	4
Pool of Urban Design 'UD' Concentration Courses								
UPL411	Urban Design Studio (3)	4	5	125	1	6	0	7
UPL432	Urban and Architectural Heritage	3	4	100	2	2	0	4
UPL441	Theories and Approaches in Landscape Design	2	5	125	1	3	0	4
UPL451	Housing, Neighbourhood Design Studio	3	5	125	1	4	0	5
UPL462	Contemporary Environmental Issues	2	4	100	2	0	0	2
UPL471	Urban Economics	2	3	75	1	2	0	3
-	ARCH Elective (1) UD & UP	2	3	75	2	0	0	2
-	ARCH Elective (2) UD & UP	2	3	75	2	0	0	2
-	ARCH Elective (3) UD	3	4	100	2	2	0	4
-	ARCH Elective (4) UD	3	4	100	2	2	0	4
UPL495	Graduation Project (3) ARCH UD	6	12	300	0	12	0	12
Pool of Urban Planning 'UP' Concentration Courses								
UPL422	City Governance and Land Management	3	4	100	2	2	0	4
UPL431	Town Planning Studio	3	5	125	1	4	0	5
UPL433	Urban Systems	3	5	125	2	2	0	4
UPL451	Housing, Neighbourhood Design Studio	3	5	125	1	4	0	5
UPL471	Urban Economics	2	3	75	1	2	0	3
UPL481	Urban Informatics	2	4	100	1	0	3	4
-	ARCH Elective (1) UD & UP	2	3	75	2	0	0	2
-	ARCH Elective (2) UD & UP	2	3	75	2	0	0	2
-	ARCH Elective (3) UP	3	4	100	2	2	0	4
-	ARCH Elective (4) UP	3	4	100	2	2	0	4
UPL496	ARCH Graduation Project (3) UP	6	12	300	0	12	0	12
Pool of ARCH Elective (1) & (2) UD & UP Courses								
UPL421	Introduction to Regional Planning	2	3	75	2	0	0	2
UPL424	Selected Topics in Urban Planning and Development	2	3	75	2	0	0	2
UPL434	Urban Upgrading for Inclusion, Sustainability and Resilience	2	3	75	2	0	0	2
UPL473	Equity and Urban Justice	2	3	75	2	0	0	2
Pool of ARCH Elective (3) & (4) UD Courses								
UPL412	The Past, Present and Future Urban Space	3	4	100	2	2	0	4
UPL415	Selected Topics in Urban Space Design	3	4	100	2	2	0	4
UPL461	Environmental Impact Assessment	3	4	100	2	2	0	4
UPL472	Urban Sociology and Human Settlements	3	4	100	2	2	0	4
UPL482	Introduction to Geo Design	3	4	100	1	4	0	5
Pool of ARCH Elective (3) & (4) UP Courses								
UPL423	Participatory Planning and Communities	3	4	100	2	2	0	4
UPL425	Selected Topics in Urbanization Issues	3	4	100	2	2	0	4
UPL452	Housing Studies and Real Estate Development	3	4	100	2	2	0	4
UPL461	Environmental Impact Assessment	3	4	100	2	2	0	4
UPL472	Urban Sociology and Human Settlements	3	4	100	2	2	0	4
UPL482	Introduction to Geo Design	3	4	100	1	4	0	5

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

** Student has to select another course from Pool of ARCH Elective (2) Courses mentioned in List of Basic Architectural Engineering Requirements courses.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041 AND PHM011
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
ARC211	Principles of Architecture Design Studio	3	6	150	1	4	0	5	CEP111
ARC212	Principles of Visual Design and Design Methods	3	5	125	2	2	0	4	
ARC241	Visual Communication in Architecture	3	5	125	1	4	1	6	CEP111
ARC251	Building (1): Conventional Construction Systems	3	5	125	2	3	0	5	CEP111
CES213	Structural Analysis for Architects	2	3	75	1	2	0	3	
CES263	Soil Mechanics and Properties of Construction Materials	2	3	75	1	2	0	3	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		18	30	750	10	17	1	28	
Semester (4)									
ARC213	Creativity Design Studio	3	6	150	1	4	0	5	ARC212 AND CEP111
ARC231	History of Arts and Architecture (1): Ancient Civilizations	2	4	100	2	0	0	2	
ARC242	Modeling of The Built Environment	2	4	100	1	3	0	4	ARC241
ARC252	Building (2): Finishing Works	3	5	125	2	3	0	5	ARC241
UPL211	Principles of Urban Design and Landscape	3	4	100	1	4	0	5	
CEP213	Surveying and Site Mobility	2	4	100	1	2	1	4	
-	ARCH Elective (1)	2	3	75	2	1	0	3	
Total		17	30	750	10	17	1	28	
Semester (5)									
ARC311	Building Type and Legislations Design Studio	3	5	125	1	4	0	5	ARC211
ARC331	History of Arts and Architecture (2): Islamic and Western Architecture	2	4	100	2	0	0	2	
ARC351	Building (3): Advanced Construction and Working Drawing Standards	3	5	125	1	5	0	6	ARC251 AND ARC251
UPL311	Context and Place Design Studio	3	5	125	1	4	0	5	
CES315	Concrete and Steel Structures	3	5	125	2	2	0	4	
MEP341	Technical Installations	2	3	75	2	1	0	2	
-	ARCH Elective (2)	2	3	75	1	2	0	3	
Total		18	30	750	10	18	0	27	
Semester (6)									
ARC312	Architectural Technology Design Studio	3	6	150	1	4	0	5	ARC311
ARC352	Working Design (1): Systems Coordination and Building Information	3	6	150	1	4	1	6	ARC351 AND MEP341
ARC362	Daylighting and Control of Thermal Environment	3	3	75	2	2	0	4	
ARC371	Architectural Projects Management and Economics	2	3	75	2	1	0	2	
UPL312	Urban and Landscape Design Studio	3	5	125	1	4	0	5	UPL311
UPL321	History and Theory of Urbanism	3	5	125	2	2	0	4	
ARC391	ARCH Graduation Project (1)	1	2	50	1	0	0	1	
Total		18	30	750	10	17	1	27	

* Only if applicable according to regulations announced by the Faculty council based on article (15).

Architecture Concentration									
Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (7)									
ARC411	Architecture and Dwelling Studio	3	6	150	1	4	0	5	ARC311
ARC412	Thematic Design Studio	3	6	150	1	4	0	5	ARC312
ARC421	Theory and Philosophy of Contemporary Architecture	2	3	75	2	0	0	2	ARC331
ARC451	Interior Design and Technical Drawings Studio	3	5	125	1	4	0	5	ARC352
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	ARCH Elective (1) AD & BT	2	3	75	2	0	0	2	
ARC491	ARCH Graduation Project (2) AD & BT	3	4	100	1	4	0	5	ARC391
Total		18	30	750	10	16	0	26	
Semester (8)									
ARC461	Acoustics in Architecture	2	3	75	2	1	0	2	PHM121
ARC422	Human Aspects in Architecture	2	3	75	2	0	0	2	
ARC441	Computational Design in Architecture	3	5	125	1	4	0	5	ARC242
-	ARCH Elective (2) AD & BT	3	3	75	3	0	0	3	
-	ARCH Elective (3) AD & BT	3	3	75	3	0	0	3	
ARC492	ARCH Graduation Project (3) AD & BT	6	13	325	0	12	0	12	ARC491
Total		19	30	750	11	17	0	27	

Building Technology Concentration									
Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (7)									
ARC413	Architectural Sustainable Rehabilitation Design Studio	4	7	175	2	5	0	7	ARC312
ARC421	Theory and Philosophy of Contemporary Architecture	2	3	75	2	0	0	2	ARC331
ARC452	Working Design (2): Blow Ups Detailing and BOQs	3	6	150	1	4	0	5	ARC352
ARC453	Advanced Technical Installation	2	4	100	2	1	0	2	
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	ARCH Elective (1) AD & BT	2	3	75	2	0	0	2	
ARC491	ARCH Graduation Project (2) AD & BT	3	4	100	1	4	0	5	ARC391
Total		18	30	750	12	14	0	25	
Semester (8)									
ARC431	Principles of Residential Development	2	3	75	2	0	0	2	
ARC443	Building Performance Simulation	3	5	125	1	4	0	5	ARC242
ARC461	Acoustics in Architecture	2	3	75	2	1	0	2	PHM121
-	ARCH Elective (2) AD & BT	3	3	75	3	0	0	3	
-	ARCH Elective (3) AD & BT	3	3	75	3	0	0	3	
ARC492	ARCH Graduation Project (3) AD & BT	6	13	325	0	12	0	12	ARC491
Total		19	30	750	11	17	0	27	

Urban Design Concentration									
Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (7)									
UPL411	Urban Design Studio (3)	4	5	125	1	6	0	7	UPL312
UPL441	Theories and Approaches in Landscape Design	2	5	125	1	3	0	4	
UPL451	Housing, Neighbourhood Design Studio	3	5	125	1	4	0	5	UPL321
UPL462	Contemporary Environmental Issues	2	4	100	2	0	0	2	
UPL471	Urban Economics	2	3	75	1	2	0	3	
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
UPL491	ARCH Graduation Project (2) UD	3	4	100	1	4	0	5	ARC391
Total		18	29	725	9	19	0	28	
Semester (8)									
UPL432	Urban and Architectural Heritage	3	4	100	2	2	0	4	
-	ARCH Elective (1) UD & UP	2	3	75	2	0	0	2	
-	ARCH Elective (2) UD & UP	2	3	75	2	0	0	2	
-	ARCH Elective (3) UD	3	4	100	2	2	0	4	
-	ARCH Elective (4) UD	3	4	100	2	2	0	4	
UPL495	ARCH Graduation Project (3) UD	6	12	300	0	12	0	12	UPL491

Urban Design Concentration									
Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Total		19	30	750	10	18	0	28	

Urban Planning Concentration									
Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (7)									
UPL431	Town Planning Studio	3	5	125	1	4	0	5	
UPL433	Urban Systems	3	5	125	2	2	0	4	
UPL451	Housing, Neighbourhood Design Studio	3	5	125	1	4	0	5	UPL321
UPL471	Urban Economics	2	3	75	1	2	0	3	
UPL481	Urban Informatics	2	4	100	1	0	3	4	
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
UPL492	ARCH Graduation Project (2) UP	3	4	100	1	4	0	5	ARC391
Total		18	29	725	9	16	3	28	
Semester (8)									
UPL422	City Governance and Land Management	3	4	100	2	2	0	4	UPL431
-	ARCH Elective (1) UD & UP	2	3	75	2	0	0	2	
-	ARCH Elective (2) UD & UP	2	3	75	2	0	0	2	
-	ARCH Elective (3) UP	3	4	100	2	2	0	4	
-	ARCH Elective (4) UP	3	4	100	2	2	0	4	
UPL496	ARCH Graduation Project (3) UP	6	12	300	0	12	0	12	UPL492
Total		19	30	750	10	18	0	28	

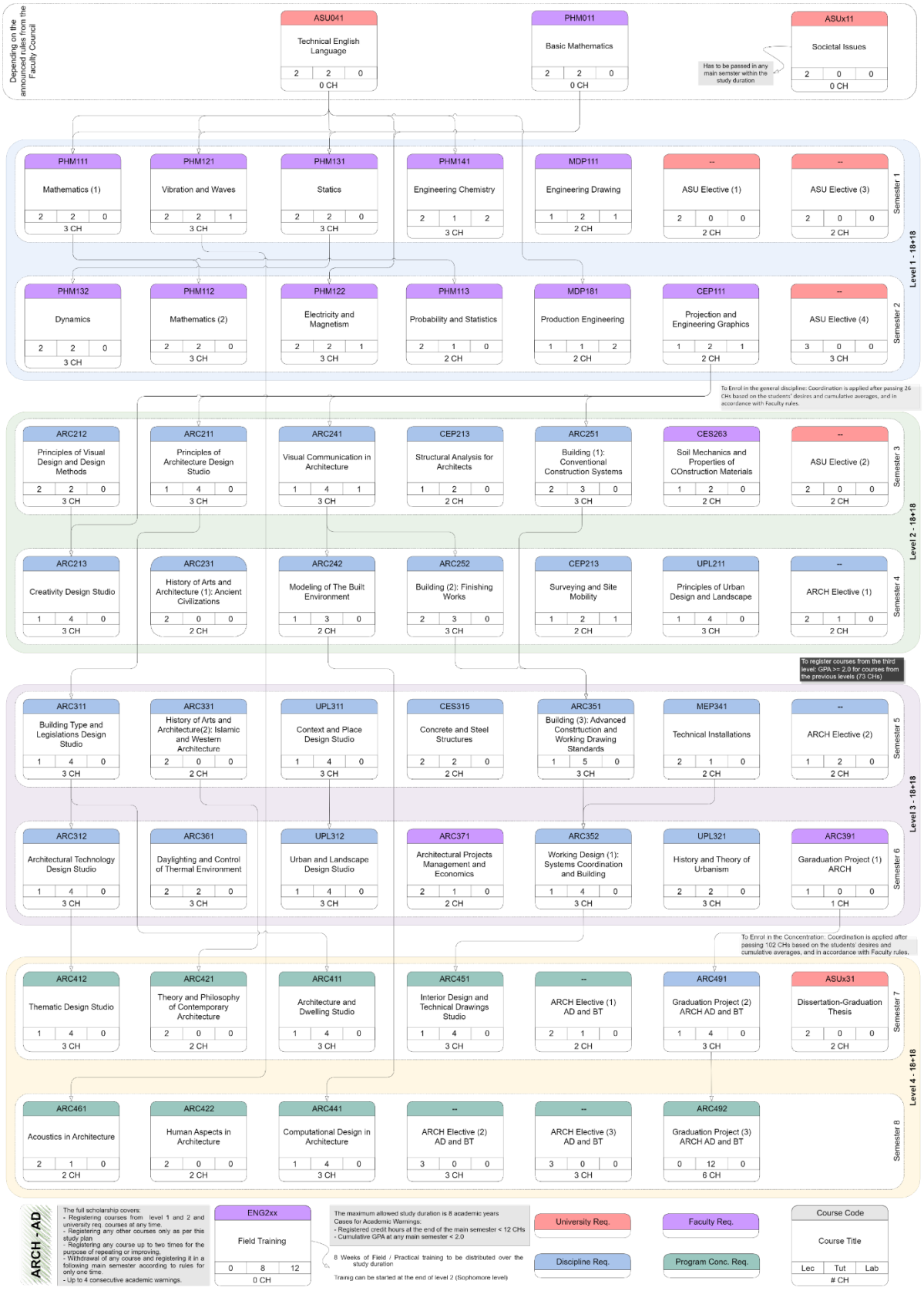

Figure 5 Course Tree for 'Architectural Engineering' Program - Architecture Concentration

Figure 6 Course Tree for 'Architectural Engineering' Program – Building Technology Concentration

Figure 7 Course Tree for 'Architectural Engineering' Program – Urban Design Concentration

Figure 8 Course Tree for 'Architectural Engineering' Program – Urban Planning Concentration

Program 06: Electrical Power and Machines Engineering Program 'EPME'

Program Description

The Electrical Power and Machines Engineering Program is designed to qualify its graduates for both fundamental and modern trends in electrical power systems, design, operation and control. The program is structured in a hierarchical manner based on strong mathematical and physics background while moving gradually up to the fundamental electrical engineering subjects. Then, reaching to the major specialty courses of power systems design, operation, installation, control and economics. The program pays significant attention to the renewable electrical energy resources as well as the smart grid operation and control with the objective of environmental conservation and economical aspects. The program adapts the updated approaches and methodology in teaching and learning activities and assessment with focus on achieving balance between academic background and professional skills of the graduates. Students in the program are centred of focus by implanting self-learning attitude, peer discussions, and courses embedded engineering skills. The assessment techniques are devised in a way to avoid passing the courses unless the student gets the required Competencies.

Career Prospects

The prospect market of the Electrical Power and Machines Engineering Program graduate is widespread. Electrical power networks planning, design, and installation in urban areas, hospitals, touristic, educational and administrative buildings is a sizable market for the graduates in engineering contracting, and manufacturing firms. Industrial control and maintenance of electrical motors, traction, escalators, and elevators are covered within the program profession. Electrical power utilities; distribution, transmission, and generation are as well as major market labour for the graduals.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☒ GOAL 6: Clean Water & Sanitation
☒ GOAL 7: Affordable & Clean Energy	☐ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☐ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Electrical Power and Machines Engineering Program graduate must be able to:

14. Select, model and analyse electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
15. Design, model and analyse an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
16. Design and implement elements, modules, sub-systems or systems using technological and professional tools.
17. Estimate and measure the performance of an electrical/electronic system and circuit under specific input excitation and evaluate its suitability for a specific application.
18. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.
19. Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.
20. Analyse the performance of electric power generation, control and distribution systems.
21. Design and perform experiments, as well as analyse and interpret experimental results related to electrical power and machines system.
22. Test and examine components, equipment and system of electrical power and machines.
23. Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer-controlled systems.
24. Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.

Graduate Attributes

The graduates from Electrical Power and Machines Engineering Program:

- Understand the concepts of basic sciences, appropriate to the electrical power and machines discipline.
- Apply analytical thinking to identify, diagnose and solve electrical power and machines engineering problems with a wide range of complexity.
- Understand the principles of electrical power systems design.
- Work in teams and leading a heterogeneous team in practical projects related to the electrical power and machines specialization.
- Recognize the role in promoting the field of electrical power engineering and contribute to its development.
- Understand the principles of operation and performance specifications of electrical power and electromechanical engineering systems in practical projects.
- Utilize the skills and modern engineering tools necessary for electrical power and machines engineering practicing.
- Motivate the self-development, engage in lifelong learning related to post- graduate and research studies in the field of electrical power and machines branch.
- Communicate effectively using different modes, tools, and languages to deal with a critical and creative manner in the problems related to electrical power projects.
- Get the knowledge of diverse applications of electrical equipment used in different projects.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 12 *List of Electrical Power and Machines Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	24	25	21	70
	Electrical Engineering Requirements	58	97	2425	40	35	7	82
EPM321	Electrical Machines (1)	3	5	125	2	2	1	5
EPM322	Electrical Machines (2)	3	5	125	2	2	1	5
EPM431	Operation and Control of Power Systems	3	5	125	2	2	1	5
EPM432	Electrical Energy Utilization	3	4	100	2	2	1	5
EPM434	Power Systems Analysis (2)	3	4	100	2	2	0	4
EPM341	High Voltage Engineering	3	5	125	2	2	1	5
EPM342	Switchgear and Substation Engineering	3	5	125	2	2	1	5
EPM351	Power Electronics (1)	3	5	125	2	2	1	5
EPM352	Power Electronics (2)	3	6	150	2	2	1	5
EPM451	Electrical Drives	3	5	125	2	2	1	5
EPM461	Power Systems Protection	2	4	100	2	1	0	3
EPM463	Digital Protection*	2	3	75	2	0	1	2
-	EPME Elective (1)	2	4	100	2	1	0	3
-	EPME Elective (2)	2	4	100	2	1	0	3
EPM492	EPME Graduation Project (3)	3	5	125	1	4	0	5
Total		144	250	6250	106	87	38	230
Pool of EPME Elective (1) Courses								
EPM421	Generalized Theory of Electrical Machines*	2	4	100	2	1	0	2
EPM422	Power Generating Stations*	2	4	100	2	1	0	2
EPM423	Design of Electrical Machines*	2	4	100	2	1	0	2
EPM424	Special Electrical Machines*	2	4	100	2	1	0	2
Pool of EPME Elective (2) Courses								
EPM435	Computer Applications in Power Engineering*	2	4	100	2	0	1	2
EPM441	High Voltage Applications*	2	4	100	2	1	0	2
EPM452	Advanced Power Electronics*	2	4	100	2	1	0	2
EPM453	Power Quality*	2	4	100	2	1	0	2
EPM473	Energy Management Systems*	2	4	100	2	1	0	2

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041 AND PHM011
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
PHM221	Quantum Physics	2	3	75	2	0	1	2	PHM112 AND PHM122

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
EPM211	Electric Circuits (1)	3	5	125	2	2	1	5	PHM122
EPM212	Electromagnetic Fields	3	5	125	2	2	0	4	PHM112 AND PHM122
CSE211	Logic Design	3	5	125	2	2	0	4	
CSE231	Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		18	30	750	14	8	3	23	
Semester (4)									
PHM224	Physics of Semiconductors and Dielectrics	3	5	125	2	2	0	4	PHM221
EPM213	Electrical Measurements	3	5	125	2	2	1	5	EPM211
EPM221	Energy Conversion and Renewable Energy	3	5	125	2	2	1	5	EPM212
ECE211	Electronics	3	5	125	2	2	1	5	EPM211
ECE251	Signals and Systems Fundamentals	3	5	125	2	2	0	4	PHM213
CSE271	System Dynamics and Control Components	3	5	125	2	2	1	5	
Total		18	30	750	12	12	4	28	
Semester (5)									
EPM311	Electric Circuits (2)	3	5	125	2	2	1	5	EPM211
EPM321	Electrical Machines (1)	3	5	125	2	2	1	5	EPM212
EPM331	Electrical Power Transmission Systems	3	5	125	2	2	0	4	EPM211
EPM341	High Voltage Engineering	3	5	125	3	0	1	4	
EPM351	Power Electronics (1)	3	5	125	2	2	1	5	
-	Elec. Elective Course for Control	3	5	125	2	2	1	5	
Total		18	30	750	13	10	5	28	
Semester (6)									
EPM322	Electrical Machines (2)	3	5	125	2	2	1	5	EPM321
EPM333	Electrical Distribution Networks	3	4	100	2	2	0	4	EPM211
EPM332	Power Systems Analysis (1)	3	5	125	2	2	1	5	EPM331
EPM342	Switchgear and Substation Engineering	3	5	125	2	2	1	5	EPM341
EPM352	Power Electronics (2)	3	6	150	2	2	1	5	EPM351
-	Elec. Elective Course for Project Management**	2	3	75	2	0	0	2	
EPM391	EPME Graduation Project (1)	1	2	50	1	0	0	1	
Total		18	30	750	13	10	4	27	
Semester (7)									
EPM431	Operation and Control of Power Systems	3	5	125	2	2	1	5	EPM332
EPM434	Power Systems Analysis (2)	3	4	100	2	2	0	4	EPM332
EPM451	Electrical Drives	3	5	125	2	2	1	5	EPM322 AND EPM352
EPM461	Power Systems Protection	2	4	100	2	1	0	2	EPM213
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	Elective Course for Embedded Systems	3	5	125	3	0	1	4	
EPM491	EPME Graduation Project (2)	2	4	100	1	2	0	3	
Total		18	30	750	14	9	3	25	
Semester (8)									
EPM432	Electrical Energy Utilization	3	4	100	2	2	1	5	
EPM463	Digital Protection	2	3	75	2	0	1	2	EPM461
-	Elective Course for Automation and Organization	3	5	125	2	2	0	4	
-	Elective Course for Advanced Mathematics	3	5	125	2	2	1	5	
-	EPME Elective (1)	2	4	100	2	1	0	3	
-	EPME Elective (2)	2	4	100	2	1	0	3	
EPM492	EPME Graduation Project (3)	3	5	125	1	4	0	5	
Total		18	30	750	13	12	3	27	

* Only if applicable according to regulations announced by the Faculty council based on article (15).
** The pool for this course contains EPM315: Projects Economy and Management and CSE432: Software Project Management.

Figure 9 Course Tree for 'Electrical Power and Machines Engineering' Program

Program 07: Electronics and Communication Engineering Program 'ELCE'

Program Description

The Electronics and Communication Engineering Program is where electronics, microwave and photonics, and communication engineering merge together to prepare the Electronics and Communication Engineer of the future.

Career Prospects

Students who earn their ECE BSc degree gain a profound understanding of electronics and communication engineering built on a thorough background of physical science, mathematics and technology. Coursework prepares students for careers in government agencies, all local and international industries – from photonic and electronic integrated circuit design, to traditional ICT companies – or for future study in graduate schools.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☐ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☒ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☐ GOAL 12: Responsible Consumption & Production
☐ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

The program qualifies graduates to work as electronics and communications engineers. The graduate can be specialized in one of the following three concentrations:

1. Electronics
2. Microwave and Photonics
3. Communication Engineering

To be specialized in any specialization, the student must select two courses from the concentration pool of elective courses for a total of 6 credit hours. The program concentration is achieved by 11 credit hours; 6 credit hours of technical elective courses and 5 credit hours of the graduation project (2) and Graduation project (3), all related to the specific concentration.

1. Electronics: Graduates are more specialized in the design of electronic systems. Graduates demonstrate additional abilities to model, analyse, design and build electronic circuits and systems.

2. Microwave and Photonics: Graduates are more specialized in the design of photonic and microwave systems. Graduates demonstrate additional abilities to model, analyse, design and build photonic and microwave components and systems.

3. Communication Engineering: Graduates are more specialized in the design of communication engineering systems. Graduates demonstrate additional abilities to model, analyse, design and build communication engineering systems and networks.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Electronics and Communications Engineering Program graduate must be able to:

14. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
15. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
16. Design and implement elements, modules, sub-systems or systems using technological and professional tools.
17. Estimate and measure the performance of an electrical/electronic system and circuit under specific input excitation and evaluate its suitability for a specific application.
18. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.
19. Understand the underlying physical phenomena and limitations of the performance of components and systems in electronics and communication engineering.
20. Demonstrate the ability to model and analyse components and systems in electronics and communication engineering and identify the software tools required to optimize their performance.
21. Design and compare between alternative components and systems in electronics and communication engineering.
22. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in electronics and communication engineering.
23. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communication Engineering.
24. Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering as listed below:

Concentration	Competence
Electronics	24a. Demonstrate additional abilities to model, analyse, design and build electronic circuits and systems.
Microwave and Photonics	24b. Demonstrate additional abilities to model, analyse, design, and build photonic and microwave components and systems.
Communication Engineering	24c. Demonstrate additional abilities to model, analyse, design, and build communication engineering systems and networks.

Graduate Attributes

The graduates from Electronics and Communications Engineering Program:

- Apply a wide spectrum of electronics & communication engineering knowledge and specialized skills using theories, and innovative thinking in real life situations.
- Identify, diagnose, and solve electronics & communication engineering problems with a wide range of complexity, variations, and limitations.
- Commit to professional ethics, engineering responsibilities and standards.

- Function effectively as an individual and as a member in a diverse team of professionals and multi-disciplinary settings.
- Recognize his/her role in promoting and enhancing the electronics & communication engineering field and scientific research nationally and internationally.
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Apply appropriate techniques, resources, and modern engineering tools necessary for the design, development, research, and innovation of electronics and communication devices and systems.
- Engage in lifelong and self-learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes and tools with diverse audiences; to deal with academic/professional challenges in a critical thinking and innovative manner.
- Demonstrate leadership, technical and practical skills, for employment and entrepreneurship.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 13 *List of Electronics and Communication Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	24	25	21	70
	Electrical Engineering Requirements	58	97	2425	40	35	7	82
ECE312	Analog Circuits (1)	3	5	125	2	2	1	5
ECE314	Advanced Semiconductor Devices*	2	4	100	2	1	0	2
ECE411	Analog Circuits (2)	3	5	125	2	2	1	5
ECE331	Fundamentals of Electromagnetics	3	5	125	2	2	1	5
ECE332	Waveguide Theory	3	5	125	2	2	1	5
ECE333	Optoelectronics	3	5	125	2	2	1	5
ECE431	Microwave Circuits	3	5	125	2	2	1	5
ECE432	Antenna Theory*	2	3	75	2	1	0	2
ECE354	Digital Signal Processing Basics*	2	4	100	2	0	1	2
ECE451	Wireless Communication Networks	3	4	100	2	2	1	5
-	ELCE Elective (1)**	3	5	125	2	2	0	4
-	ELCE Elective (2)**	3	5	125	2	2	0	4
-	ELCE Elective (3)**	3	5	125	2	2	0	4
-	ELCE Elective (4)**	3	5	125	2	2	0	4
ECE493	ELCE Graduation Project (3)	3	4	100	0	6	0	6
Total		145	250	6250	105	90	36	228
Pool of ECE Elective Courses for 'Electronics' Concentration**								
ECE412	VLSI Design	3	5	125	2	2	1	5
ECE413	Radio Frequency Circuits and Systems	3	5	125	2	2	0	4
ECE414	Electronic Instrumentation	3	5	125	2	2	0	4
ECE415	Selected Topics in Electronics Engineering	3	5	125	2	2	0	4
ECE416	CMOS Analog Integrated Circuits	3	5	125	2	2	0	4
ECE417	Integrated Circuits Technology	3	5	125	2	2	0	4
ECE418	ASIC Design	3	5	125	2	0	2	4
ECE419	MEMS Design	3	5	125	2	2	0	4
Pool of ECE Elective Courses for 'Microwave and Photonics' Concentration**								
ECE433	Optical Communication Systems	3	5	100	2	2	0	4
ECE434	Fundamentals of Photonics	3	5	125	2	2	0	4
ECE435	Optical MEMS	3	5	125	2	2	0	4
ECE436	Selected Topics in Electromagnetics	3	5	125	2	2	0	4
Pool of ELCE Elective Courses for 'Communications Engineering' Concentration**								
ECE452	Information Theory	3	5	125	2	2	0	4
ECE453	Satellite Communication Systems	3	5	125	2	2	0	4

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
ECE454	Selected Topics in Communication Systems	3	5	125	2	2	0	4
ECE455	Selected Topics in Telecommunication Networks	3	5	125	2	2	0	4

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.
** The courses in the three areas of specializations are considered one big pool, the student has to take any four courses from this big pool.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	4	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	5	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
PHM221	Quantum Physics	2	3	75	2	0	1	2	PHM112 AND PHM122
EPM211	Electric Circuits (1)	3	5	125	2	2	1	5	PHM122
EPM212	Electromagnetic Fields	3	5	125	2	2	0	4	PHM112 AND PHM122
CSE211	Logic Design	3	5	125	2	2	0	4	
CSE231	Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		18	30	750	14	8	3	23	
Semester (4)									
PHM224	Physics of Semiconductors and Dielectrics	3	5	125	2	2	0	4	PHM221
EPM213	Electrical Measurements	3	5	125	2	2	1	5	EPM211
EPM221	Energy Conversion and Renewable Energy	3	5	125	2	2	1	5	EPM212
ECE211	Electronics	3	5	125	2	2	1	5	EPM211
ECE251	Signals and Systems Fundamentals	3	5	125	2	2	0	4	PHM213
CSE271	System Dynamics and Control Components	3	5	125	2	2	1	5	
Total		18	30	750	12	12	4	28	
Semester (5)									
PHM312	Complex Variables, Special Functions and Partial Differential Equations	3	5	125	2	2	0	4	PHM213
ECE311	Digital Circuits	3	5	125	2	2	1	5	CSE211
ECE331	Fundamentals of Electromagnetics	3	5	125	2	2	1	5	PHM213 AND EPM212
ECE351	Fundamentals of Communication Systems	3	5	125	2	2	0	4	ECE251
CSE312	Computer Organization	3	5	125	2	2	0	4	CSE211 AND CSE231
-	Elec. Elective Course for Control	3	5	125	2	2	1	5	
Total		18	30	750	12	12	3	27	
Semester (6)									
ECE312	Analog Circuits (1)	3	5	125	2	2	1	5	ECE211
ECE332	Waveguide Theory	3	5	125	2	2	1	5	ECE331
ECE333	Optoelectronics	3	5	125	2	2	1	5	PHM224
ECE352	Analog and Digital Communication Systems	3	5	125	2	2	1	5	ECE351
ECE354	Digital Signal Processing Basics	2	4	100	2	0	1	2	ECE251
ECE353	Telecommunication Networks	3	4	100	2	2	0	4	ECE351

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
ECE391	ELCE Graduation Project (1)	1	2	50	1	0	0	1	
Total		18	30	750	13	10	5	27	
Semester (7)									
ECE314	Advanced Semiconductor Devices	2	4	100	2	1	0	2	PHM224
ECE411	Analog Circuits (2)	3	5	125	2	2	1	5	ECE211
ECE431	Microwave Circuits	3	5	125	2	2	1	5	ECE332
ECE451	Wireless Communication Networks	3	4	100	2	2	1	5	ECE352
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
CSE411	Real-Time Embedded Systems Design	3	5	125	2	2	1	5	CSE312
ECE491	ELCE Graduation Project (2)	2	4	100	1	2	0	3	ECE391
Total		18	30	750	13	11	4	27	
Semester (8)									
ECE432	Antenna Theory	2	3	75	2	1	0	2	ECE332
-	Elec. Elective Course for Project Management**	2	3	75	2	0	0	2	
-	ELCE Elective (1)	3	5	125	2	2	0	4	
-	ELCE Elective (2)	3	5	125	2	2	0	4	
-	ELCE Elective (3)	3	5	125	2	2	0	4	
-	ELCE Elective (4)	3	5	125	2	2	0	4	
ECE493	ELCE Graduation Project (3)	3	4	100	0	6	0	6	ECE491
Total		19	30	750	12	15	0	26	

* Only if applicable according to regulations announced by the Faculty council based on article (15).
** The pool for this course contains EPM315: Projects Economy and Management and CSE432: Software Project Management.

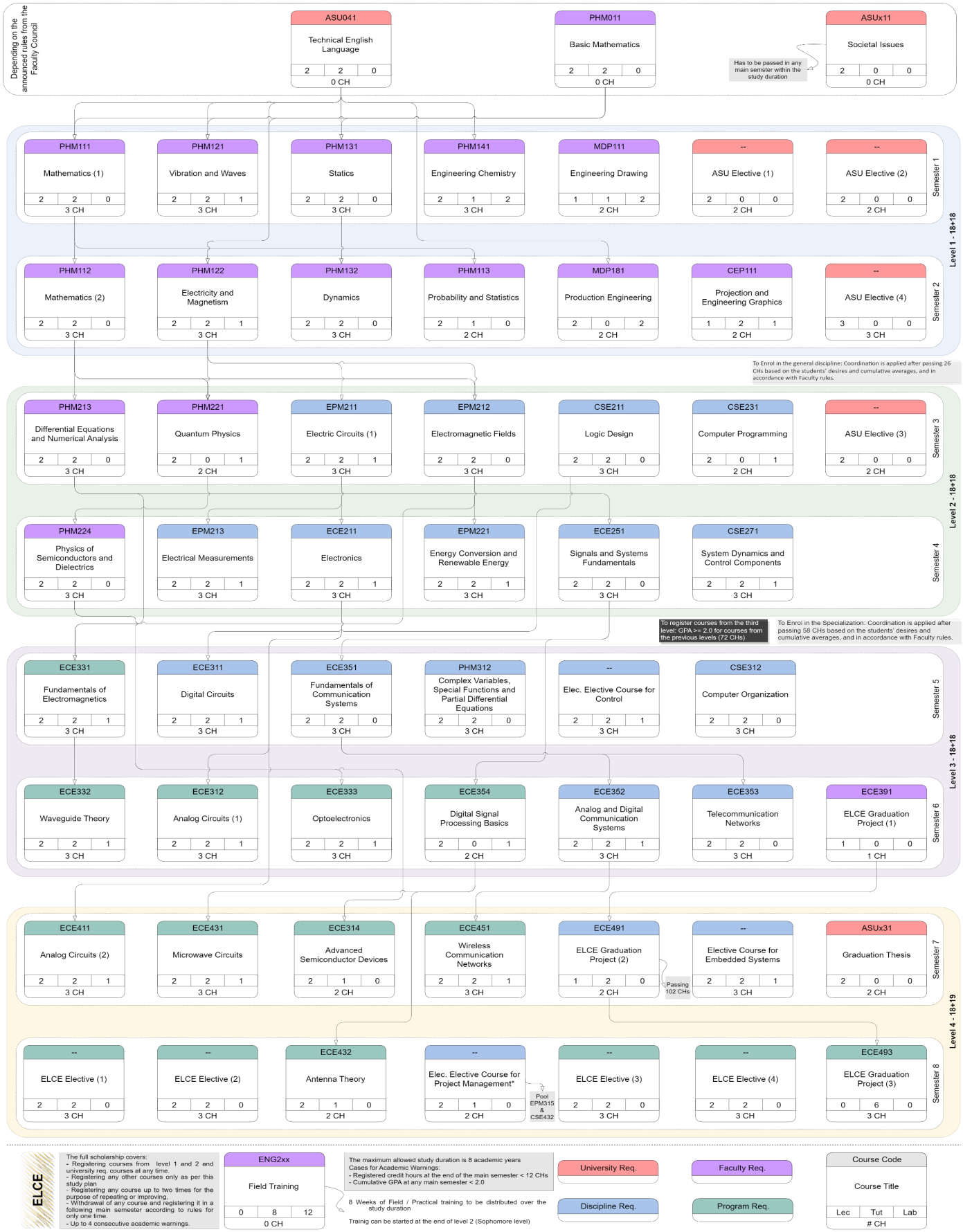

Figure 10 Course Tree for 'Electronics and Communication Engineering' Program

Program 08: Computer and Systems Engineering Program 'CSYE'

Program Description

The Computer and Systems Engineering Program is where engineering, hardware, software, and information merge together to prepare the computer and systems engineer of the future. The specialization provides the foundation required to analyze, design and evaluate system software, middleware, and software/hardware architectures and interfaces of computer systems and computer-controlled devices. Graduates of the program are involved in both the design of computer architecture and needed software. Working in the field of computer and systems engineering demands learning programming languages and software testing, algorithms and data structures, hardware and embedded systems, data networks and their security, multimedia systems, and artificial intelligence concepts.

Career Prospects

Computer and systems engineering is currently one of the most rapidly growing engineering disciplines worldwide with the advances in fields, such as smart systems, machine learning, multimedia systems, data sciences, cloud computing, computer and network security, autonomous vehicles, Internet of things, embedded systems, computer architecture, electronic design automation, VLSI Systems and others. Graduates from the department are in high demand from the industry, not only from companies in Egypt, but also from all over the world.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☒ GOAL 2: Zero Hunger	☒ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☒ GOAL 6: Clean Water & Sanitation
☒ GOAL 7: Affordable & Clean Energy	☒ GOAL 8: Decent Work & Economic Growth	☒ GOAL 9: Industry, Innovation & Infrastructure	☒ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☒ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☒ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Specialities

Studying in this program qualifies graduates to work as Computer and Systems engineers in one -or more of the following four specialities.

1. Computer Design: This specialty prepares program graduates to work in the field of hardware engineering, including embedded systems, digital circuit design, VLSI systems, electronic design automation, and hardware-based systems.

2. Computer Software: This specialty prepares program graduates to work as Software Engineer, in different disciplines. It focuses on the engineering part of software development and management.

3. Computer Networks and Security: This specialty prepares program graduates to design, inspect, and operate different types of data and telecommunication networks. The graduate is also prepared to be involved in the field of security, forensics and Internet of Things.

4. Systems and Artificial Intelligence: This specialty prepares program graduates to work as a system engineer, including multimedia, automation, and artificial intelligence.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Computer and Systems Engineering Program graduate must be able to:

14. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
15. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
16. Design and implement elements, modules, sub-systems or systems using technological and professional tools.
17. Estimate and measure the performance of an electrical/electronic system and circuit under specific input excitation and evaluate its suitability for a specific application.
18. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.
19. Design and implement elements, modules, sub-systems or systems using technological and professional tools.
20. Select and analyse appropriate control techniques for digital engineering systems.
21. Estimate and measure the performance of a digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
22. Identify needs, plan and manage resources, and gather information for solving a specific digital problem and document and communicate this solution efficiently.
23. Identify problems, critically review facts, recognize the root causes, and provide multiple, practical and sound solutions.
24. Define the blueprint for the product/service development plan with structured work streams, time scales and milestones ensuring optimization of activities, resources and cost.
25. Select suitable technical options for digital systems and services design while optimizing cost and quality.
26. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.
27. Establish an environment to build, test and release digital systems in a more rapid, frequent and reliable manner by emphasizing the collaboration and communication of developers and operations team members.
28. Organize information and knowledge resources in an optimal format.
29. Undertake research and supports new solutions to provide for concepts, ideas, product/service improvement.

Graduate Attributes

The graduates from Computer and Systems Engineering Program:

- Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.

- Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to engineering ethics and standards.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Use techniques, skills and modern engineering tools necessary for engineering practice.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- Demonstrate leadership qualities, business administration and entrepreneurial skills.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 14 *List of Computer and Systems Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	25	25	20	70
	Electrical Engineering Requirements	58	97	2425	41	33	8	82
CSE313	Computer Architecture	3	5	125	2	2	0	4
CSE331	Advanced Computer Programming	3	5	125	2	1	2	5
CSE332	Software Engineering	3	5	125	2	2	0	4
CSE333	Data Structures and Algorithms	3	5	125	2	1	2	5
CSE334	Database Systems	3	5	125	2	2	1	5
CSE335	Operating Systems	3	5	125	2	2	0	4
CSE431	Design and Analysis of Algorithms	3	5	125	2	2	1	5
CSE452	Computer and Network Security	3	4	100	2	2	0	4
CSE471	Artificial Intelligence	3	4	100	2	2	0	4
CSE472	Digital Image Processing	3	5	125	2	2	0	4
-	CSYE Elective (1)*	2	4	100	2	0	0	2
-	CSYE Elective (2)*	2	4	100	2	0	0	2
-	CSYE Elective (3)*	2	4	100	2	0	0	2
-	CSYE Elective (4)*	2	4	100	2	0	0	2
CSE492	CSYE Graduation Project (3)	3	5	125	1	4	0	5
Total		144	250	6250	108	80	34	222
Pool of CSYE 'Computer Design' Courses*								
CSE314	Fault-Tolerant Digital Systems**	2	4	100	2	1	0	2
CSE414	Real-Time Operating Systems**	2	4	100	2	1	0	2
CSE415	High-Performance Architectures**	2	4	100	2	1	0	2
CSE416	Electronic Design Automation**	2	4	100	2	1	0	2
CSE417	Hardware Security**	2	4	100	2	1	0	2
CSE418	Quantum Computing and Security**	2	4	100	2	1	0	2
CSE419	Selected Topics in Computer Design**	2	4	100	2	1	0	2
ECE315	Digital Systems Design**	2	4	100	2	1	0	2
Pool of CSYE 'Computer Software' Courses*								
CSE336	Software Design Patterns**	2	4	100	2	1	0	2
CSE337	Software Testing**	2	4	100	2	1	0	2
CSE338	Agile Software Engineering**	2	4	100	2	1	0	2
CSE433	Compilers**	2	4	100	2	1	0	2

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
CSE434	Advanced Database Systems**	2	4	100	2	1	0	2
CSE435	Internet Programming**	2	4	100	2	1	0	2
CSE436	Mobile Programming**	2	4	100	2	1	0	2
CSE437	Selected Topics in Computer Software**	2	4	100	2	1	0	2
Pool of CSYE 'Computer Networks and Security' Courses*								
CSE453	Cloud Computing**	2	4	100	2	1	0	2
CSE454	Digital Forensics**	2	4	100	2	1	0	2
CSE455	Pervasive Computing and Internet of Things**	2	4	100	2	1	0	2
CSE456	Wireless Networks**	2	4	100	2	1	0	2
CSE457	Network Operations and Management**	2	4	100	2	1	0	2
CSE458	Selected Topics in Computer Networks and Security**	2	4	100	2	1	0	2
Pool of CSYE 'Systems and Artificial Intelligence' Courses*								
CSE372	Digital Control Systems**	2	4	100	2	1	0	2
CSE373	Robotics Engineering**	2	4	100	2	1	0	2
CSE374	Machine Learning and Pattern Recognition**	2	4	100	2	1	0	2
CSE473	Fundamentals of Deep Learning**	2	4	100	2	1	0	2
CSE474	Fundamentals of Computational Intelligence**	2	4	100	2	1	0	2
CSE475	Machine Vision**	2	4	100	2	1	0	2
CSE476	Business Intelligence and Big-Data Analytics**	2	4	100	2	1	0	2
CSE477	Fundamentals of Natural Language Processing**	2	4	100	2	1	0	2
CSE478	Biomedical Engineering**	2	4	100	2	1	0	2
CSE479	Selected Topics in Systems and Artificial Intelligence**	2	4	100	2	1	0	2

* The courses in the four areas of specializations are considered one big pool, the student has to take any four courses from this big pool.
** Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM213	Differential Equations and Numerical Analysis	3	5	125	2	2	0	4	PHM112
PHM221	Quantum Physics	2	3	75	2	0	1	2	PHM112 AND PHM122
EPM211	Electric Circuits (1)	3	5	125	2	2	1	5	PHM122
EPM212	Electromagnetic Fields	3	5	125	2	2	0	4	PHM112 AND PHM122
CSE211	Logic Design	3	5	125	2	2	0	4	
CSE231	Computer Programming	2	4	100	2	0	1	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		18	30	750	14	8	3	23	
Semester (4)									
PHM224	Physics of Semiconductors and Dielectrics	3	5	125	2	2	0	4	PHM221
EPM213	Electrical Measurements	3	5	125	2	2	1	5	EPM211
EPM221	Energy Conversion and Renewable Energy	3	5	125	2	2	1	5	EPM212
ECE211	Electronics	3	5	125	2	2	1	5	EPM211
ECE251	Signals and Systems Fundamentals	3	5	125	2	2	0	4	PHM213
CSE271	System Dynamics and Control Components	3	5	125	2	2	1	5	

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Total		18	30	750	12	12	4	28	
Semester (5)									
PHM311	Discrete Mathematics	3	4	100	2	2	0	4	
CSE312	Computer Organization	3	5	125	2	2	0	4	CSE211 AND CSE231
CSE331	Advanced Computer Programming	3	5	125	2	1	2	5	CSE231
CSE332	Software Engineering	3	5	125	2	2	0	4	CSE231
CSE371	Control Engineering	3	5	125	2	2	0	4	CSE271 AND ECE251
-	Elective Course for Transmission and Communications	3	5	125	2	2	0	4	
Total		18	29	725	12	11	2	25	
Semester (6)									
CSE313	Computer Architecture	3	5	125	2	2	0	4	CSE312
CSE333	Data Structures and Algorithms	3	5	125	2	1	2	5	CSE331
CSE334	Database Systems	3	5	125	2	2	1	5	CSE331
CSE335	Operating Systems	3	5	125	2	2	0	4	CSE312
CSE351	Computer Networks	3	4	100	2	2	1	5	
-	CSYE Elective (1)	2	4	100	2	0	0	2	
CSE391	CSYE Graduation Project (1)	1	2	50	0	2	0	2	
Total		18	30	750	12	11	4	27	
Semester (7)									
CSE411	Real-Time Embedded Systems Design	3	5	125	2	2	1	5	CSE312
CSE431	Design and Analysis of Algorithms	3	5	125	2	2	1	5	CSE333
CSE471	Artificial Intelligence	3	4	100	2	2	0	4	PHM311 AND CSE231
CSE472	Digital Image Processing	3	5	125	2	2	0	4	ECE251
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	CSYE Elective (2)	2	4	100	2	0	0	2	
CSE491	CSYE Graduation Project (2)	2	4	100	1	2	1	4	CSE391
Total		18	30	750	13	10	3	26	
Semester (8)									
CSE413	Digital Systems Testing and Verification	3	5	125	2	2	0	4	CSE313 AND CSE331
CSE451	Parallel and Distributed Systems	3	5	125	2	2	0	4	CSE351
CSE452	Computer and Network Security	3	4	100	2	2	0	4	CSE351
-	Elec. Elective Course for Project Management**	2	3	75	2	1	0	3	
-	CSYE Elective (3)	2	4	100	2	0	0	2	
-	CSYE Elective (4)	2	4	100	2	0	0	2	
CSE492	CSYE Graduation Project (3)	3	5	125	1	4	0	5	CSE491
Total		18	30	750	13	11	0	24	

* Only if applicable according to regulations announced by the Faculty council based on article (15).
** The pool for this course contains EPM315: Projects Economy and Management and CSE432: Software Project Management.

Figure 11 Course Tree for 'Computer and Systems Engineering' Program

Program 09: Structural Engineering Program 'STRE'

Program Description

The program aims to supply the students with the advanced concepts of structure design, quality control of construction material and basics of site investigation. Student will learn the main criteria of design of main concrete and steel structures. The program aims to provide skills of laboratory, office and site engineer in term of preparation of specifications, project schedule, design, quality control plan, and construction supervision process. Student will have basics of design of steel bridges, concrete bridges, special concrete and steel structures, different types of foundation, shoring system, irrigation structures, and highway roads according to recent design codes versions. Management of project recourses, risk, safety is essential knowledge for structure engineers. The program main goal is to share in the urban development of Egypt, by graduating highly skill structure engineers.

Career Prospects

Structure engineers have versatile opportunities in design companies, construction companies, consulting firms, research entities and educational institutes or other similar organizations. Possible jobs are design engineer, field engineer, construction developer, research assistant, quality engineer, and technical sales engineer.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☐ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☐ GOAL 8: Decent Work & Economic Growth	☐ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☐ GOAL 12: Responsible Consumption & Production
☐ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Structural Engineering Program graduate must be able to:

14. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.

15. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbours; or any other emerging field relevant to the discipline.
16. Plan and manage construction processes; address construction defects, instability and quality issues; and maintain safety measures in construction and materials.
17. Deal with biddings, contracts and financial issues including project insurance and guarantees; and assess environmental impacts of civil engineering projects.
18. Analyze structural systems under different type of loads using advanced computational methods.
19. Demonstrate the knowledge of designing, repairing, and strengthening advanced structural systems using conventional (i.e., concrete, masonry, and steel) and modern materials and techniques.
20. Design and ensure the safety and stability of the foundation system, the ground beneath it, and construction techniques.
21. Have a great vision about the load path within different structural elements, that has a big influence on the innovation in the structural design.
22. Demonstrate knowledge in the fields of management project resources, risk, safety, and legal issues in construction.

Graduate Attributes

The graduates from Structural Engineering Program:

- Master a wide spectrum of engineering knowledge and specialized skills, including a thorough grasp of techniques for assessing structures (encompassing both static and dynamic analysis), crafting load-resistant designs using materials such as concrete and steel, understanding fundamental principles of mechanics, and gaining familiarity with safety-oriented building codes and legal regulations.
- Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity, variation and diversity of engineering challenges to make well-informed decisions.
- Behave professionally and adhere to engineering and sustainability ethics and standards. In contemporary engineering, it is vital for graduates to comprehend sustainable design principles and effectively reduce the ecological footprint of structures. This involves focusing on sustainability in design, with an emphasis on minimizing environmental impact and optimizing resource utilization.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance by developing effective communication skills, both written and verbal, collaborating with other professionals, and presenting technical information to stakeholders.
- Recognize his/her role in promoting the structural engineering field and contribute in the development of the profession and the community.
- Assume full responsibility for own learning and self-development by raising awareness of the need for ongoing learning to stay up-to-date with new technologies and engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Develop a comprehensive grasp of construction materials and techniques, enabling the acquisition of a diverse array of construction methods to ensure the seamless transformation of designs into secure and functional structures.
- Enhance comprehension of project management principles to proficiently strategize and implement structural engineering projects while adhering to budgetary and timeline limitations.

- Encourage the establishment of a Safety Awareness culture. by giving precedence to safety in every facet of their tasks, taking into account the safety and welfare of both occupants and users of the structures they engineer.
- Promote awareness of Value Engineering: Recognizing the importance of precise construction.
- project cost estimation is vital. This entails discovering methods to reach project goals while reducing expenditures.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 15 *List of Structural Engineering Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	24	25	20	69
	Civil Engineering Requirements	62	101	2525	43	36	11	90
CES311	Structural Analysis (1)	3	5	125	2	2	0	4
CES312	Structural Analysis (2)	3	5	125	2	2	0	4
CES411	Structural Analysis (3)	4	5	125	3	2	0	5
CES323	Design Principles*	2	3	75	2	1	0	2
CES421	Design of Prestressed-Concrete and Concrete Bridges	3	4	100	2	2	0	4
CES422	Special Topics in Concrete Design	3	5	125	2	2	0	4
CES342	Design and Behavior of Steel Structures (2)	3	5	125	2	2	0	4
CES441	Integrated Design of Steel Bridges	3	4	100	2	2	0	4
CES442	Advanced Design of Steel Bridges	3	4	100	2	2	0	4
CES352	Strengthening and Repair of Structures	3	4	100	2	2	0	4
CES471	Construction Project Management*	2	4	100	2	1	0	2
CEI435	Design of Hydraulic Structures*	2	4	100	2	1	0	3
-	STRE Elective (1)	2	3	75	2	0	0	2
-	STRE Elective (2)	2	3	75	2	0	0	2
-	STRE Elective (3)	2	3	75	2	0	0	2
CES492	STRE Graduation Project (3)	3	4	100	2	2	0	4
Total		150	250	6250	113	84	31	226
Pool of STRE Elective (1) Courses								
CES472	Project Risk and Safety Management*	2	3	75	2	1	0	2
CES473	Construction Contracts and Cost Estimation*	2	3	75	2	1	0	2
Pool of STRE Elective (2) Courses								
CES423	Masonry Structures*	2	3	75	2	1	0	2
CES427	Construction Techniques of Concrete Structures*	2	3	75	2	1	0	2
CES444	Construction of Steel Structures*	2	3	75	2	1	0	2
CES451	Advanced Composite Materials*	2	3	75	2	1	0	2
CES452	Special Types of Concrete*	2	3	75	2	1	0	2
CES453	Sustainability of Construction and Building Physics*	2	3	75	2	1	0	2
Pool of STRE Elective (3) Courses								
CES412	Computer Aided Structural Design*	2	3	75	2	1	0	2
CES413	Earthquake Engineering*	2	3	75	2	1	0	2
CES414	Finite Element Method*	2	3	75	2	1	0	2
CES415	Dynamic Floor Vibrations*	2	3	75	2	1	0	2
CES424	Design of Concrete Bridges*	2	3	75	2	1	0	2
CES443	Behaviour of Steel Structures*	2	3	75	2	1	0	2
Pool of STRE Elective (4) Courses								
CES431	Design of Structural Concrete using Strut and Tie Method*	2	3	75	2	1	0	2
CES445	Steel Plated Structures*	2	3	75	2	1	0	2
CES462	Ground Improvement*	2	4	100	2	1	0	2
CES474	Management of Project Resources*	2	3	75	2	1	0	2

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM212	Differential Equations for Civil Engineering	2	4	100	2	1	0	2	PHM112
CES211	Structural Mechanics (1)	4	6	150	3	2	0	5	PHM131
CES251	Structures and Properties of Construction Materials	2	3	75	2	1	0	2	
CEP211	Introduction to Plane Surveying	3	5	125	2	1	2	5	
CEI211	Fluid Mechanics	3	4	100	2	2	1	5	PHM131
CEI231	Civil Drawing	2	4	100	1	3	0	4	CEP111 AND MDP111
CEI241	Engineering Hydrology	2	4	100	2	1	0	2	
Total		18	30	750	14	11	3	25	
Semester (4)									
CES212	Structural Mechanics (2)	3	5	125	2	2	0	4	CES211
CES221	Concrete Design (1)	2	3	75	2	1	0	2	CES211
CES252	Materials Testing and Properties	2	4	100	2	0	1	2	CES251
CES261	Geology and Geotechnical Engineering (1)	3	4	100	2	2	1	5	
CEP212	Introduction to Topographical Surveying	3	5	125	2	2	1	5	CEP211
CEP221	Highways and Transportation Engineering	3	5	125	2	2	0	4	
CEI212	Hydraulics	3	4	100	2	1	2	5	CEI211
Total		19	30	750	14	10	5	27	
Semester (5)									
CES311	Structural Analysis (1)	3	5	125	2	2	0	4	CES212
CES322	Design Principles	2	3	75	2	1	0	2	
CES341	Design and Behavior of Steel Structures (1)	3	5	125	2	2	0	4	CES212
CES351	Concrete Technology	3	5	125	2	2	1	5	CES252
CES361	Geotechnical Engineering (2)	3	5	125	2	2	1	5	CES261
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		16	26	650	12	9	2	22	
Semester (6)									
CES312	Structural Analysis (2)	3	5	125	2	2	0	4	CES311
CES321	Concrete Design (2)	2	4	100	2	1	0	2	CES221
CES342	Design and Behavior of Steel Structures (2)	3	5	125	2	2	0	4	CES341
CES362	Foundation Engineering (1)	3	5	125	2	2	0	4	CES361
-	Civil Engineering Elective (2)	3	5	125	2	2	0	4	
-	Civil Engineering Elective (3)**	2	3	75	2	1	0	2	
Total		16	27	675	12	10	0	20	
Semester (7)									
CES411	Structural Analysis (3)	4	5	125	3	2	0	5	CES312
CES323	Design of Concrete Floors and Halls	4	6	150	2	4	0	6	CES321
CES441	Integrated Design of Steel Bridges	3	4	100	2	2	0	4	CES342
CES352	Strengthening and Repair of Structures	3	4	100	2	2	0	4	CES351
CES391	STRE Graduation Project (1)	1	2	50	0	2	0	2	CES322
Total		15	21	525	9	12	0	21	
Semester (8)									
CES422	Special Topics in Concrete Design	3	5	125	2	2	0	4	CES323
CEI435	Design of Hydraulic Structures	2	4	100	2	1	0	2	CES261 AND CEI212
CES442	Advanced Design of Steel Bridges	3	4	100	2	2	0	4	CES441
CES461	Foundation Engineering (2)	3	5	125	2	2	0	4	CES361
CES471	Construction Project Management	2	4	100	2	1	0	2	CES371 OR CEI324

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
CES491	STRE Graduation Project (2)	3	4	100	2	2	1	5	CES323 AND CES342 AND CES362 AND CES391
Total		16	26	650	12	10	1	21	
Semester (9)									
CES421	Design of Prestressed-Concrete and Concrete Bridges	3	4	100	2	2	0	4	CES323
-	STRE Elective (1)	2	3	75	2	0	0	2	CES371 OR CEI324
-	STRE Elective (2)	2	3	75	2	0	0	2	CES391
-	STRE Elective (3)	2	3	75	2	0	0	2	CES391
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
CES492	STRE Graduation Project (3)	3	4	100	2	2	0	4	CES411 AND CES441 AND CES491
		14	20	500	12	4	0	16	

* Only if applicable according to regulations announced by the Faculty council based on article (15).
** The pool for this course contains CES371: Project Management Essentials in Construction and CEI324: Engineering Economics and Management.

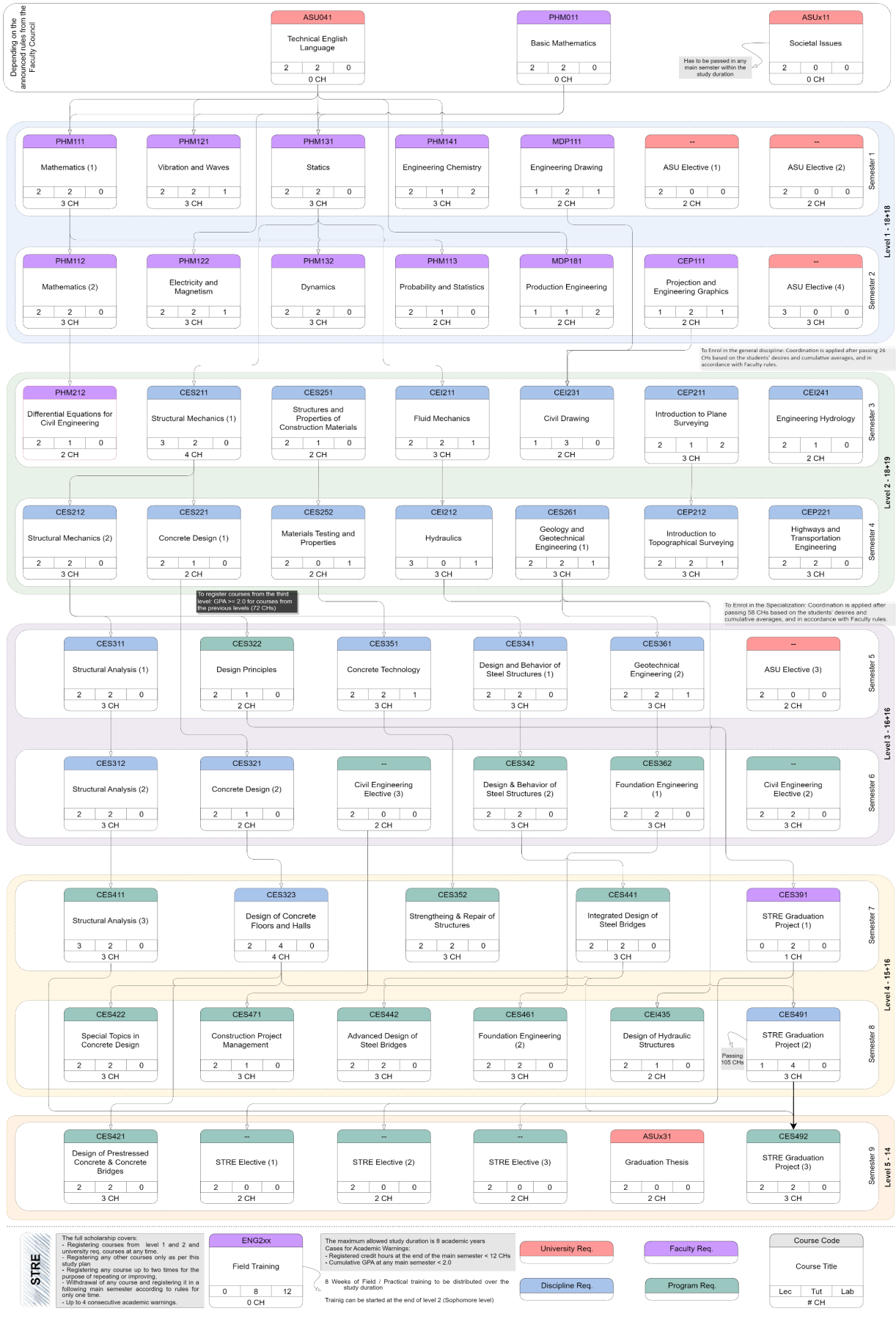

Figure 12 Course Tree for 'Structural Engineering' Program

Proposed Compact Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM212	Differential Equations for Civil Engineering	2	4	100	2	1	0	2	PHM112
CES211	Structural Mechanics (1)	4	6	150	3	2	0	5	PHM131
CES251	Structures and Properties of Construction Materials	2	3	75	2	1	0	2	
CEP211	Introduction to Plane Surveying	3	5	125	2	1	2	5	
CEI211	Fluid Mechanics	3	4	100	2	2	1	5	PHM131
CEI231	Civil Drawing	2	4	100	1	3	0	4	CEP111 AND MDP111
CEI241	Engineering Hydrology	2	4	100	2	1	0	2	
Total		18	30	750	14	11	3	25	
Semester (4)									
CES212	Structural Mechanics (2)	3	5	125	2	2	0	4	CES211
CES221	Concrete Design (1)	2	3	75	2	1	0	2	CES211
CES252	Materials Testing and Properties	2	4	100	2	0	1	2	CES251
CES261	Geology and Geotechnical Engineering (1)	3	4	100	2	2	1	5	
CEP212	Introduction to Topographical Surveying	3	5	125	2	2	1	5	CEP211
CEP221	Highways and Transportation Engineering	3	5	125	2	2	0	4	
CEI212	Hydraulics	3	4	100	2	1	2	5	CEI211
Total		19	30	750	14	10	5	27	
Semester (5)									
CES311	Structural Analysis (1)	3	5	125	2	2	0	4	CES212
CES321	Concrete Design (2)	2	4	100	2	1	0	2	CES221
CES322	Design Principles	2	3	75	2	1	0	2	
CES341	Design and Behavior of Steel Structures (1)	3	5	125	2	2	0	4	CES212
CES351	Concrete Technology	3	5	125	2	2	1	5	CES252
CES361	Geotechnical Engineering (2)	3	5	125	2	2	1	5	CES261
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		18	30	750	14	10	2	24	
Semester (6)									
CES312	Structural Analysis (2)	3	5	125	2	2	0	4	CES311
CES323	Design of Concrete Floors and Halls	4	6	150	2	4	0	6	CES321
CES342	Design and Behavior of Steel Structures (2)	3	5	125	2	2	0	4	CES341
CES352	Strengthening and Repair of Structures	3	4	100	2	2	0	4	CES351
CES362	Foundation Engineering (1)	3	5	125	2	2	0	4	CES361
-	Civil Engineering Elective (3)***	2	3	75	2	1	0	2	
CES391	STRE Graduation Project (1)	1	2	50	0	2	0	2	CES322
Total		19	30	750	12	15	0	26	
Semester (7)**									
CES411	Structural Analysis (3)	4	5	125	3	2	0	5	CES312
CES422	Special Topics in Concrete Design	3	5	125	2	2	0	4	CES323
CES441	Integrated Design of Steel Bridges	3	4	100	2	2	0	4	CES342
CES461	Foundation Engineering (2)	3	5	125	2	2	0	4	CES361
CES471	Construction Project Management	2	4	100	2	1	0	2	CES371 OR CEI324
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
CES491	STRE Graduation Project (2)	3	4	100	2	2	1	5	CES323 AND CES342 AND CES362 AND CES391
Total		20	30	750	15	11	1	26	
Semester (8)**									

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
CES421	Design of Prestressed-Concrete and Concrete Bridges	3	4	100	2	2	0	4	CES323
CEI435	Design of Hydraulic Structures	2	4	100	2	1	0	2	CES261 AND CEI212
CES442	Advanced Design of Steel Bridges	3	4	100	2	2	0	4	CES441
-	Civil Engineering Elective (2)	3	5	125	2	2	0	4	
-	STRE Elective (1)	2	3	75	2	0	0	2	CES391
-	STRE Elective (2)	2	3	75	2	0	0	2	CES391
-	STRE Elective (3)	2	3	75	2	0	0	2	CES391
CES492	STRE Graduation Project (3)	3	4	100	2	2	0	4	CES411 AND CES441 AND CES491
Total		20	30	750	16	9	0	24	

* Only if applicable according to regulations announced by the Faculty council based on article (15).
** Applicable only if student has Cumulative GPA ≥ 3.0 till the previous semester according to Article (22).
*** The pool for this course contains CES371: Project Management Essentials in Construction and CEI324: Engineering Economics and Management.

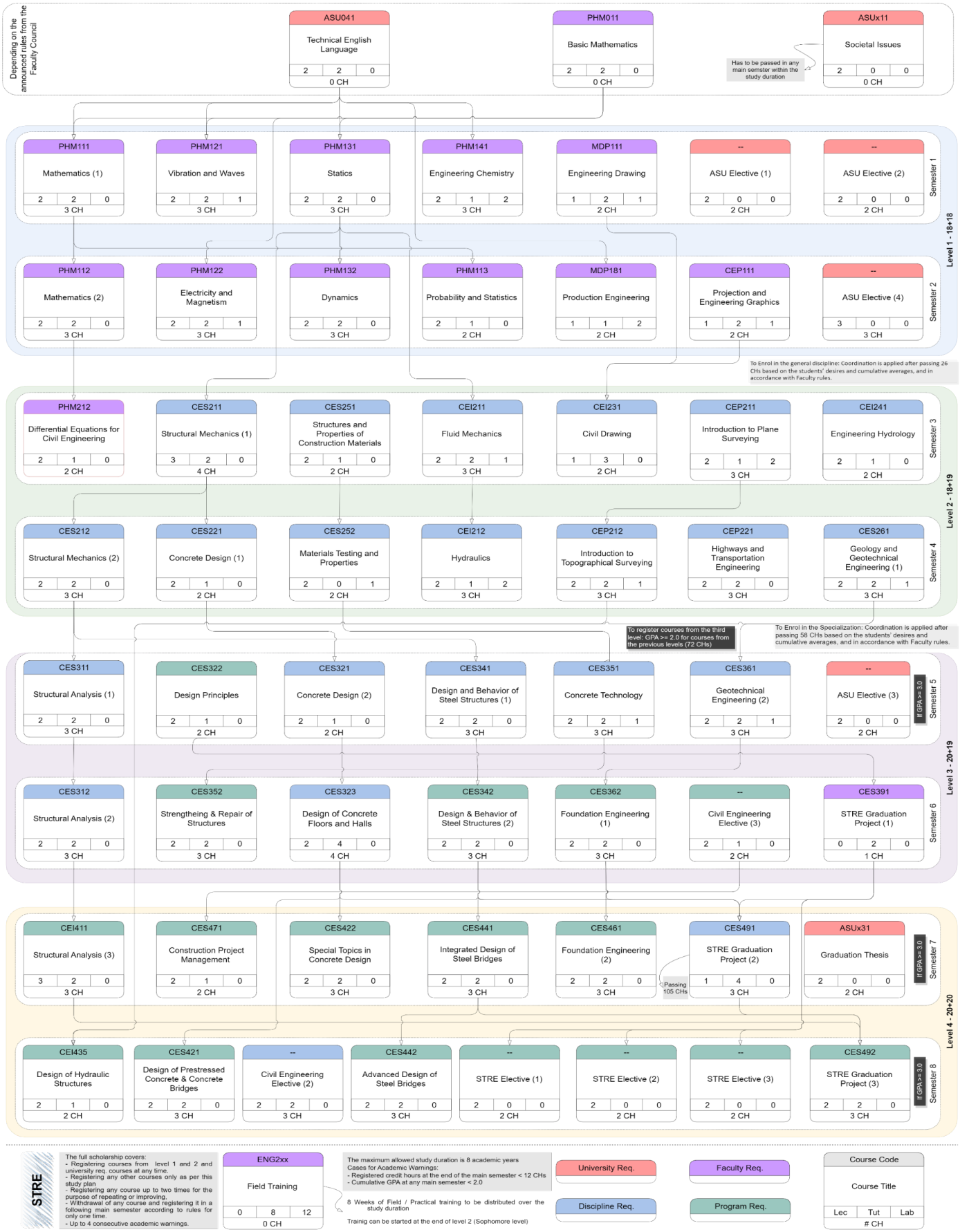

Figure 13 Course Tree for 'Structural Engineering' Program – Compact Study Plan

Program 10: Water Engineering and Hydraulic Structures Program 'WENG'

Program Description

The program supplies the student with the required civil engineering skills with focus on how to design, construct, evaluate and manage water systems for different purposes. This involves understanding of basic and advanced water engineering principles. The student learns how to use the state-of-the-art technologies such as computer software and satellite images in collection and analysis of data in water environments. By the end of the program, the student will have the ability to employ hydraulic systems and hydraulic structures to deal with hydrologic problems, water resources management, irrigation and drainage networks, design and construction of harbors, and shore protection works.

Career Prospects

Water engineers are civil engineers who use their expertise in areas such as hydraulics and hydraulic structures, hydrologic studies and water resources management, coastal and river engineering, and planning, and mathematics and computer analysis to solve problems associated with the control and use of water and developing sustainable water systems. They have the required knowledge and skills to join research and academic institutions, governmental authorities, design and construction engineering firms and offices that deal with flood control and protection, hydraulic structures and urban infrastructures, hydroelectric power development, irrigation and drainage engineering, harbor engineering and shore protection, and other water engineering facilities.

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☒ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☐ GOAL 8: Decent Work & Economic Growth	☐ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☐ GOAL 12: Responsible Consumption & Production
☐ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Water Engineering and Hydraulic Structures Program graduate must be able to:

14. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by

applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.

15. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbours; or any other emerging field relevant to the discipline.
16. Plan and manage construction processes; address construction defects, instability and quality issues; and maintain safety measures in construction and materials.
17. Deal with biddings, contracts and financial issues including project insurance and guarantees; and assess environmental impacts of civil engineering projects.
18. Identify principles in the fields of fluid mechanics, hydraulics, irrigation and drainage, hydrology, water resources, and apply principles of GIS in water engineering.
19. Design and analyse crossing structures, control structures, navigation structures, harbour structures, storage work and produce civil drawings.
20. Consider environmental issues in hydraulics, coastal engineering, ground water and surface water hydrology, river engineering, water quality, climate change, conduct field and laboratory measurements, and assess environmental impact of water engineering projects.
21. Plan and design irrigation and drainage systems, hydraulic networks, sustainable drainage systems and pump stations.
22. Demonstrate knowledge in the fields of water concrete structures, foundation of water structures, sanitary works, roadways and transportation systems and their codes of practice and standards.
23. Use some computer programs and information technology in the field of water engineering and hydraulic structures.

Graduate Attributes

The graduates from Water Engineering and Hydraulic Structures Program:

- Master a wide spectrum of water engineering knowledge and specialized skills, specifically in the realm of environmental aspects and sustainability and can apply acquired knowledge using theories and abstract thinking in real life situations.
- Apply analytic critical and systemic thinking to identify, diagnose and solve water engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to water engineering and sustainability ethics and standards.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Recognize his/her role in promoting the water engineering field and contribute in the development of the engineering profession and the community;
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Use techniques, skills and modern engineering tools necessary for water engineering practice.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- Demonstrate leadership qualities, business and project administration and entrepreneurial skills.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 16 *List of Water Engineering and Hydraulic Structures Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	24	26	20	70
	Civil Engineering Requirements	59	96	2400	42	34	10	86
CEI411	Network Hydraulics	3	5	125	2	1	2	5
CEI331	Design of Irrigation Works*	2	4	100	2	1	0	2
CEI432	Hydraulic Structures (1)	3	5	125	2	2	0	4
CEI433	Hydraulic Structures (2)	3	4	100	2	2	0	4
CEI341	Environmental Hydrology*	2	3	75	2	1	0	2
CEI441	Groundwater Hydrology	3	4	100	2	2	0	4
CEI451	Water Resources Engineering*	2	4	100	2	1	0	2
CEI461	Coastal Engineering*	2	4	100	2	1	0	2
CEI462	Port Engineering and Navigation*	2	3	75	2	1	0	2
CES471	Construction Project Management*	2	4	100	2	1	0	2
CEP451	Water and Wastewater Treatment	3	5	125	2	2	0	4
-	WENG Elective (1)	3	5	125	2	2	0	4
-	WENG Elective (2)	3	5	125	2	2	0	4
-	WENG Elective (3)	3	5	125	2	2	0	4
-	WENG Elective (4)	2	4	100	2	0	0	2
CEI492	WENG Graduation Project (3)	3	6	150	0	6	0	6
Total		145	250	6250	109	87	32	222
Pool of WENG Elective (1) Courses								
CEI312	Environmental Hydraulics	3	5	125	2	2	0	4
CEI353	Water Quality	3	5	125	2	2	0	4
CEI352	Climate Change Adaptation in Water Resources Field	3	5	125	2	2	0	4
Pool of WENG Elective (2) Courses								
CEI311	Pump Stations Hydraulics	3	5	125	2	2	0	4
CEI354	Lab and Field Measurements in Water Resources Field	3	5	125	2	2	0	4
CEI322	Advanced Irrigation Engineering	3	5	125	2	2	0	4
CEI351	Geographical Information Systems in Water Engineering	3	5	125	2	2	0	4
Pool of WENG Elective (3) Courses								
CEI431	Dams Engineering	3	5	125	2	2	0	4
CEI463	Coastal Environment Engineering	3	5	125	2	2	0	4
CEI421	Sustainable Drainage Systems	3	5	125	2	2	0	4
CEI412	River Engineering	3	5	125	2	2	0	4
Pool of WENG Elective (4) Courses								
CEI434	Hydraulic Structures (3)*	2	4	100	2	1	0	3
CEI464	Environmental Impact Assessment for Water Engineering Projects*	2	4	100	2	1	0	3
CEI452	Non-Conventional Water Resources*	2	4	100	2	1	0	3

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM212	Differential Equations for Civil Engineering	2	4	100	2	1	0	2	PHM112
CES211	Structural Mechanics (1)	4	6	150	3	2	0	5	PHM131
CES251	Structures and Properties of Construction Materials	2	3	75	2	1	0	2	
CEP211	Introduction to Plane Surveying	3	5	125	2	1	2	5	
CEI211	Fluid Mechanics	3	4	100	2	2	1	5	PHM131
CEI231	Civil Drawing	2	4	100	1	3	0	4	CEP111 AND MDP111
CEI241	Engineering Hydrology	2	4	100	2	1	0	3	
Total		18	30	750	14	11	3	26	
Semester (4)									
CES212	Structural Mechanics (2)	3	5	125	2	2	0	4	CES211
CES221	Concrete Design (1)	2	3	75	2	1	0	2	CES211
CES252	Materials Testing and Properties	2	4	100	2	0	1	2	CES251
CES261	Geology and Geotechnical Engineering (1)	3	4	100	2	2	1	5	
CEP212	Introduction to Topographical Surveying	3	5	125	2	2	1	5	CEP211
CEP221	Highways and Transportation Engineering	3	5	125	2	2	0	4	
CEI212	Hydraulics	3	4	100	2	1	2	5	CEI211
Total		19	30	750	14	10	5	27	
Semester (5)									
CEI321	Irrigation and Drainage Engineering	3	5	125	2	2	0	4	CEI212 AND CEI241
CEI341	Environmental Hydrology	2	3	75	2	1	0	2	CEI212 AND CEI241
CES321	Concrete Design (2)	2	4	100	2	1	0	2	CES221
CES341	Design and Behavior of Steel Structures (1)	3	5	125	2	2	0	4	CES212
CES351	Concrete Technology	3	5	125	2	2	1	5	CES252
CES361	Geotechnical Engineering (2)	3	5	125	2	2	1	5	CES261
-	ASU Elective (3)	2	3	75	2	0	0	2	
Total		18	30	750	14	10	2	24	
Semester (6)									
CEI324	Engineering Economics and Management	2	3	75	2	1	0	2	
CEI331	Design of Irrigation Works	2	4	100	2	1	0	2	CEI321 AND CES261
CES323	Design of Concrete Floors and Halls	4	6	150	2	4	0	6	CES321
CEP451	Water and Wastewater Treatment	3	5	125	2	2	0	4	PHM141 AND CEI241
-	WENG Elective (1)	3	5	125	2	2	0	4	
-	WENG Elective (2)	3	5	125	2	2	0	4	
CEI391	WENG Graduation Project (1)	1	2	50	0	2	0	2	
Total		18	30	750	12	14	0	24	
Semester (7)									
CEI411	Network Hydraulics	3	5	125	2	1	2	5	CEI212
CEI432	Hydraulic Structures (1)	3	5	125	2	2	0	4	CEI231 AND CEI331
CEI451	Water Resources Engineering	2	4	100	2	1	0	2	CEI312 AND CEI341
CEI461	Coastal Engineering	2	4	100	2	1	0	2	CEI212 AND CES366
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	WENG Elective (3)	3	5	125	2	2	0	4	
CEI491	WENG Graduation Project (2)	3	4	100	1	4	0	5	CEI391
Total		18	30	750	13	11	2	24	
Semester (8)									
CEI433	Hydraulic Structures (2)	3	4	100	2	2	0	4	CEI432
CEI441	Groundwater Hydrology	3	4	100	2	2	0	4	CEI341
CEI462	Port Engineering and Navigation	2	3	75	2	1	0	2	CEI461
CES471	Construction Project Management	2	4	100	2	1	0	2	CEI324
-	Civil Engineering Elective (1)	3	5	125	2	2	0	4	
-	WENG Elective (4)	2	4	100	2	0	0	2	
CEI492	WENG Graduation Project (3) WENG	3	6	150	0	6	0	6	CEI491
Total		18	30	750	12	14	0	24	

* Only if applicable according **to** regulations announced by the Faculty council based on article (15).

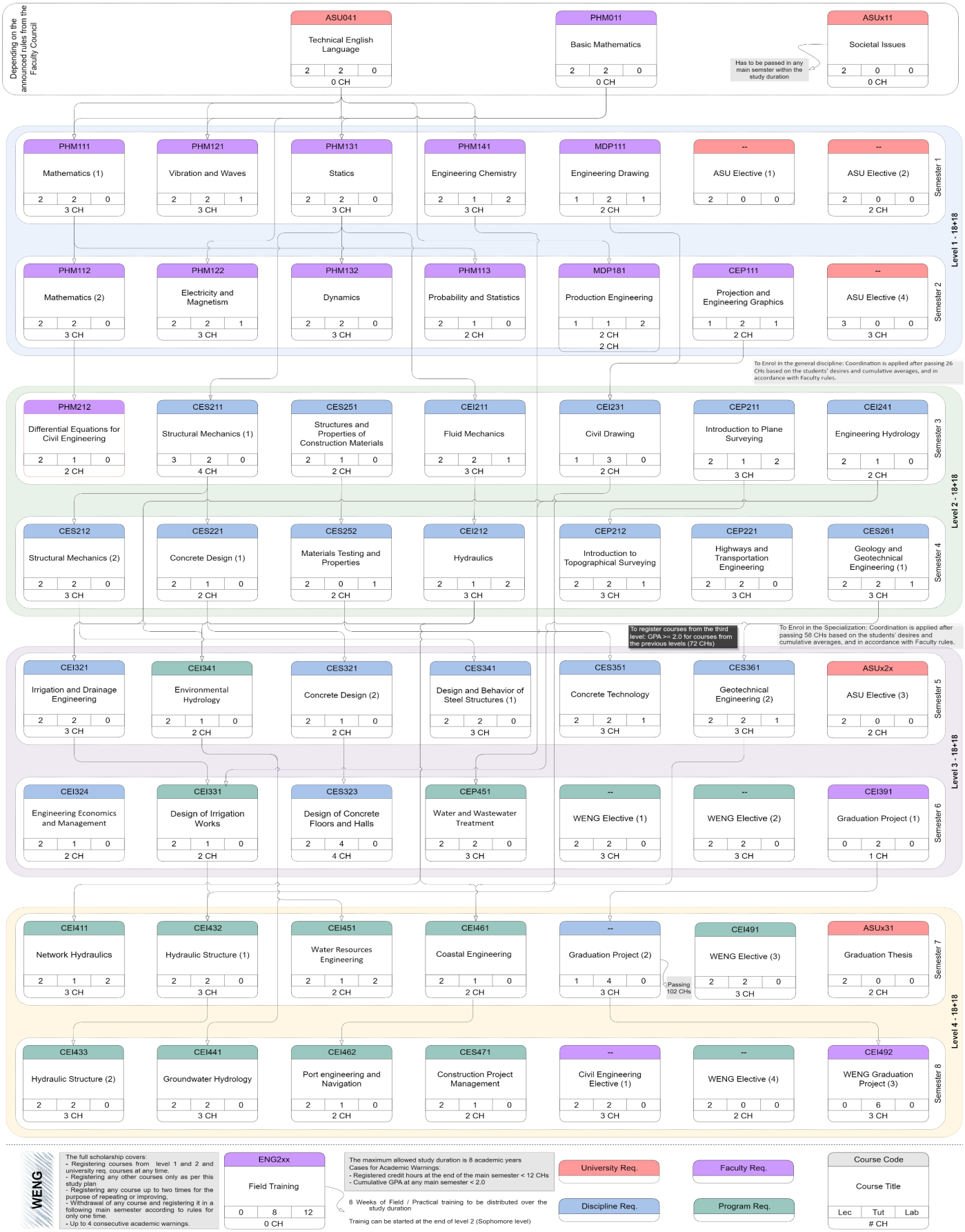

Figure 14 Course Tree for 'Water Engineering and Hydraulic Structures' Program

Program 11: Utilities and Infrastructure Program 'UINE'

Program Description

Utilities and Infrastructure Program (formerly Public Works Engineering) is the heart of public utilities and infrastructure development programs in cities as well as national levels. Utilities and Infrastructure engineers deal with providing effective, efficient and sustainable public infrastructure. The Utilities and Infrastructure program aims at providing well educated civil engineers with special expertise in sustainable Utilities and Infrastructure planning and infrastructure management, surveying engineering, water and wastewater networks, water and wastewater treatment, solid waste management, highway and airport engineering, transportation planning, traffic engineering and railway engineering. The program also aims at preparing its graduates to appreciate sustainable integrated Utilities and Infrastructure systems. This will support preparing engineers that can meet present and future challenges in Egypt, the Arab countries and world community are facing to provide sustainable and efficient Utilities and Infrastructure.

Career Prospects

Utilities and Infrastructure engineers use their expertise in areas such as surveying, structural engineering, environmental engineering, sanitary engineering, transportation planning, traffic engineering, highways and airport engineering, railway engineering as well as mathematics and computer analysis to solve problems associated with the planning, design, construction, operation and maintenance of Utilities and Infrastructure systems. These systems include roads, airports, highway networks, transport systems, railway systems, traffic management, water and wastewater networks, water and wastewater treatment facilities and solid waste management. Graduates of this program can work with:

- Government authorities
- Municipalities
- Urban infrastructure organizations
- Consulting firms in civil engineering and construction
- Civil engineering contractors and project managers
- Water and sanitation utility companies
- Transport authorities and operating companies
- Environmental engineering organizations
- Water regulatory authority

Relation to Sustainable Development Goals

☐ GOAL 1: No Poverty	☐ GOAL 2: Zero Hunger	☐ GOAL 3: Good Health & Well-being	☒ GOAL 4: Quality Education	☐ GOAL 5: Gender Equality	☒ GOAL 6: Clean Water & Sanitation
☐ GOAL 7: Affordable & Clean Energy	☐ GOAL 8: Decent Work & Economic Growth	☐ GOAL 9: Industry, Innovation & Infrastructure	☐ GOAL 10: Reduced Inequality	☒ GOAL 11: Sustainable Cities & Communities	☒ GOAL 12: Responsible Consumption & Production
☒ GOAL 13: Climate Action	☐ GOAL 14: Life Below Water	☐ GOAL 15: Life on Land	☐ GOAL 16: Peace & Justice Strong Institutions	☐ GOAL 17: Partnerships to achieve the Goal	

Program Concentrations

There are no specified concentrations in this Program.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

In addition to the competences for Graduates from Ain Shams University and all Engineering Programs, the Utilities and Infrastructure Program graduate must be able to:

14. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.
15. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbours; or any other emerging field relevant to the discipline.
16. Plan and manage construction processes; address construction defects, instability and quality issues; and maintain safety measures in construction and materials.
17. Deal with biddings, contracts and financial issues including project insurance and guarantees; and assess environmental impacts of civil engineering projects.
18. Identify principles in the fields of surveying, geodesy, photogrammetry, remote sensing, roads and airport systems, traffic engineering, transportation planning, railway engineering, water and wastewater systems and their codes of practice and standards.
19. Plan and design of roads and highways, railways, transport systems, traffic management systems, water and wastewater networks and treatment facilities and produce civil drawings.
20. Consider environmental issues in transportation planning and traffic engineering, water and wastewater systems, solid waste management, conduct field and laboratory measurements, and assess environmental impact of public works engineering projects.
21. Use wide-range of analytical tools, techniques, equipment, and software packages in the field of surveying, remote sensing, transportation engineering and water and sanitation facilities.
22. Demonstrate knowledge and understanding and carry out maintenance of all elements for different types of roads, airports, pavements and traffic systems.
23. Demonstrate knowledge, understanding and application of transportation planning and traffic engineering models and systems at various planning scales.
24. Demonstrate knowledge, understanding, and utilization of plane and topographic surveying techniques, processes and equipment, photogrammetry and the Global Positioning system (GPS) in engineering projects.
25. Demonstrate knowledge and understanding of railway engineering and train operations systems.
26. Demonstrate knowledge and understanding of water and wastewater networks and treatment facilities and demonstrate knowledge of environment pollution and solid waste management.

Graduate Attributes

The graduates from Utilities and Infrastructure Program:

- Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.
- Apply analytic critical and systemic thinking to identify, diagnose and solve civil engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to civil engineering ethics and standards.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Recognize his/her role in promoting the civil engineering field and contribute in the development of the civil profession and the community.
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Use techniques, skills, and modern engineering tools necessary for civil engineering practice.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- Demonstrate leadership qualities, business and project administration and entrepreneurial skills.

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

Table 17 *List of Utilities and Infrastructure Program Requirements courses.*

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	11	18	450	13	0	0	13
	Faculty of Engineering Requirements	34	66	1650	24	26	20	70
	Civil Engineering Requirements	59	96	2400	43	32	10	85
CEP311	Advanced Plane Surveying*	2	3	75	2	0	1	2
CEP312	Engineering Surveying	3	5	125	2	2	1	5
CEP411	Geodetic Surveying*	2	4	100	2	1	0	2
CEP321	Transportation Planning	3	4	100	2	2	0	4
CEP322	Traffic Engineering	3	5	125	2	2	0	4
CEP331	Highways and Airport Engineering	3	4	100	2	2	0	4
CEP341	Railway Engineering (1)	3	5	125	2	2	0	4
CEP451	Water and Wastewater Treatment	3	5	125	2	2	0	4
CES311	Structural Analysis (1)	3	5	125	2	2	0	4
CES312	Structural Analysis (2)	3	5	125	2	2	0	4
CES463	Geotechnical Engineering for Infrastructures*	2	3	75	2	1	0	2
CEP431	Highway Construction Technology	3	5	125	2	2	0	4
-	UINE Elective (1)	2	4	100	2	0	0	2
-	UINE Elective (2)	2	4	100	2	0	0	2
-	UINE Elective (3)	2	4	100	2	0	0	2
CEP492	UINE Graduation Project (3)	3	5	125	1	4	0	5
Total		146	250	6250	111	82	32	222
Pool of UINE Elective (1) Courses								
CEP412	Geographic Information Systems*	2	4	100	2	1	0	2
CEP432	Selected Topics in Highways and Airports Engineering*	2	4	100	2	1	0	2
CEP441	Railway Engineering (2)*	2	4	100	2	1	0	2
CEP452	Environmental Engineering*	2	4	100	2	1	0	2

Code	Course Title	Weight			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
Pool of UINE Elective (2) Courses								
CEP414	Hydrographic Surveying*	2	4	100	2	1	0	2
CEP421	Traffic Management Systems*	2	4	100	2	1	0	2
CEP435	Road and Airport Maintenance*	2	4	100	2	1	0	2
CEP453	Sludge Management*	2	4	100	2	1	0	2
CEI453	Hydraulic Modeling Analysis*	2	4	100	2	1	0	2
Pool of UINE Elective (3) Courses								
CEP413	Advanced Topographic Surveying*	2	4	100	2	1	0	2
CEP422	Traffic Studies and Analysis*	2	4	100	2	1	0	2
CEP442	Railway Signaling Systems*	2	4	100	2	1	0	2
CEP454	Solid Waste Management*	2	4	100	2	1	0	2

* Specific Courses that have office hours as clarified in Article (18) and Appendix 3.

Proposed Study Plan

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
Semester (1)									
PHM111	Mathematics (1)	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM121	Vibration and Waves	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM131	Statics	3	5	125	2	2	0	4	ASU041* AND PHM011*
PHM141	Engineering Chemistry	3	5	125	2	1	2	5	ASU041*
MDP111	Engineering Drawing	2	4	100	1	2	1	4	
-	ASU Elective (1)	2	3	75	2	0	0	2	
-	ASU Elective (2)	2	3	75	2	0	0	2	
Total		18	30	750	13	9	4	26	
Semester (2)									
PHM112	Mathematics (2)	3	5	125	2	2	0	4	PHM111
PHM113	Probability and Statistics	2	3	75	2	1	0	2	PHM111
PHM122	Electricity and Magnetism	3	5	125	2	2	1	5	ASU041* AND PHM011*
PHM132	Dynamics	3	5	125	2	2	0	4	PHM131
MDP181	Production Engineering	2	4	100	1	1	2	4	ASU041*
CEP111	Projection and Engineering Graphics	2	4	100	1	2	1	4	
-	ASU Elective (4)	3	4	100	3	0	0	3	
Total		18	30	750	13	10	4	26	
Semester (3)									
PHM212	Differential Equations for Civil Engineering	2	4	100	2	1	0	2	PHM112
CES211	Structural Mechanics (1)	4	6	150	3	2	0	5	PHM131
CES251	Structures and Properties of Construction Materials	2	3	75	2	1	0	2	
CEP211	Introduction to Plane Surveying	3	5	125	2	1	2	5	
CEI211	Fluid Mechanics	3	4	100	2	2	1	5	PHM131
CEI231	Civil Drawing	2	4	100	1	3	0	4	CEP111 AND MDP111
CEI241	Engineering Hydrology	2	4	100	2	1	0	2	
Total		18	30	750	14	11	3	25	
Semester (4)									
CES212	Structural Mechanics (2)	3	5	125	2	2	0	4	CES211
CES221	Concrete Design (1)	2	3	75	2	1	0	2	CES211
CES252	Materials Testing and Properties	2	4	100	2	0	1	2	CES251
CES261	Geology and Geotechnical Engineering (1)	3	4	100	2	2	1	5	
CEP212	Introduction to Topographical Surveying	3	5	125	2	2	1	5	CEP211
CEP221	Highways and Transportation Engineering	3	5	125	2	2	0	4	
CEI212	Hydraulics	3	4	100	2	1	2	5	CEI211
Total		19	30	750	14	10	5	27	
Semester (5)									
CEP311	Advanced Plane Surveying	2	3	75	2	0	1	2	CEP211
CEP321	Transportation Planning	3	4	100	2	2	0	4	CEP221
CEP331	Highways and Airport Engineering	3	4	100	2	2	0	4	CEP221
CES311	Structural Analysis (1)	3	5	125	2	2	0	4	CES212
CES321	Concrete Design (2)	2	4	100	2	1	0	2	CES221
CES351	Concrete Technology	3	5	125	2	2	1	5	CES252
CES361	Geotechnical Engineering (2)	3	5	125	2	2	1	5	CES261
Total		19	30	750	14	11	3	26	
Semester (6)									

Code	Course Title	Weight			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
CEP312	Engineering Surveying	3	5	125	2	2	1	5	CEP211
CEP322	Traffic Engineering	3	5	125	2	2	0	4	CEP221
CEP341	Railway Engineering (1)	3	5	125	2	2	0	4	CEP221
-	Civil Engineering Elective (1)	3	5	125	2	2	0	4	
-	Civil Engineering Elective (2)	3	5	125	2	2	0	4	
-	Civil Engineering Elective (3)	2	3	75	2	1	0	2	
CEP391	UINE Graduation Project (1)	1	2	50	0	2	0	2	
Total		18	30	750	12	13	1	25	
Semester (7)									
CEP411	Geodetic Surveying	2	4	100	2	1	0	2	
CEP431	Highway Construction Technology	3	5	125	2	2	0	4	CEP331
CEP451	Water and Wastewater Treatment	3	5	125	2	2	0	4	PHM141 AND CEI241
CES341	Design and Behavior of Steel Structures (1)	3	5	125	2	2	0	4	CES212
ASUx31	Graduation Thesis	2	3	75	2	0	0	2	
-	UINE Elective (1)	2	4	100	2	0	0	2	
CEP491	UINE Graduation Project (2)	3	4	100	2	2	1	5	CEP391
Total		18	30	750	14	9	1	23	
Semester (8)									
CES312	Structural Analysis (2)	3	5	125	2	2	0	4	CES311
CES323	Design of Concrete Floors and Halls	4	6	150	2	4	0	6	CES321
CES463	Geotechnical Engineering for Infrastructures	2	3	75	2	1	0	2	CES361
-	UINE Elective (2)	2	4	100	2	0	0	2	
-	UINE Elective (3)	2	4	100	2	0	0	2	
-	ASU Elective (3)	2	3	75	2	0	0	2	
CEP492	UINE Graduation Project (3)	3	5	125	1	4	0	5	CEP491
Total		18	30	750	13	11	0	23	

* Only if applicable according to regulations announced by the Faculty council based on article (15).

Figure 15 Course Tree for 'Utilities and Infrastructure' Program

Bylaw 2023 QR code

https://eng.asu.edu.eg/education/undergraduates/bylaws