الباب السادس

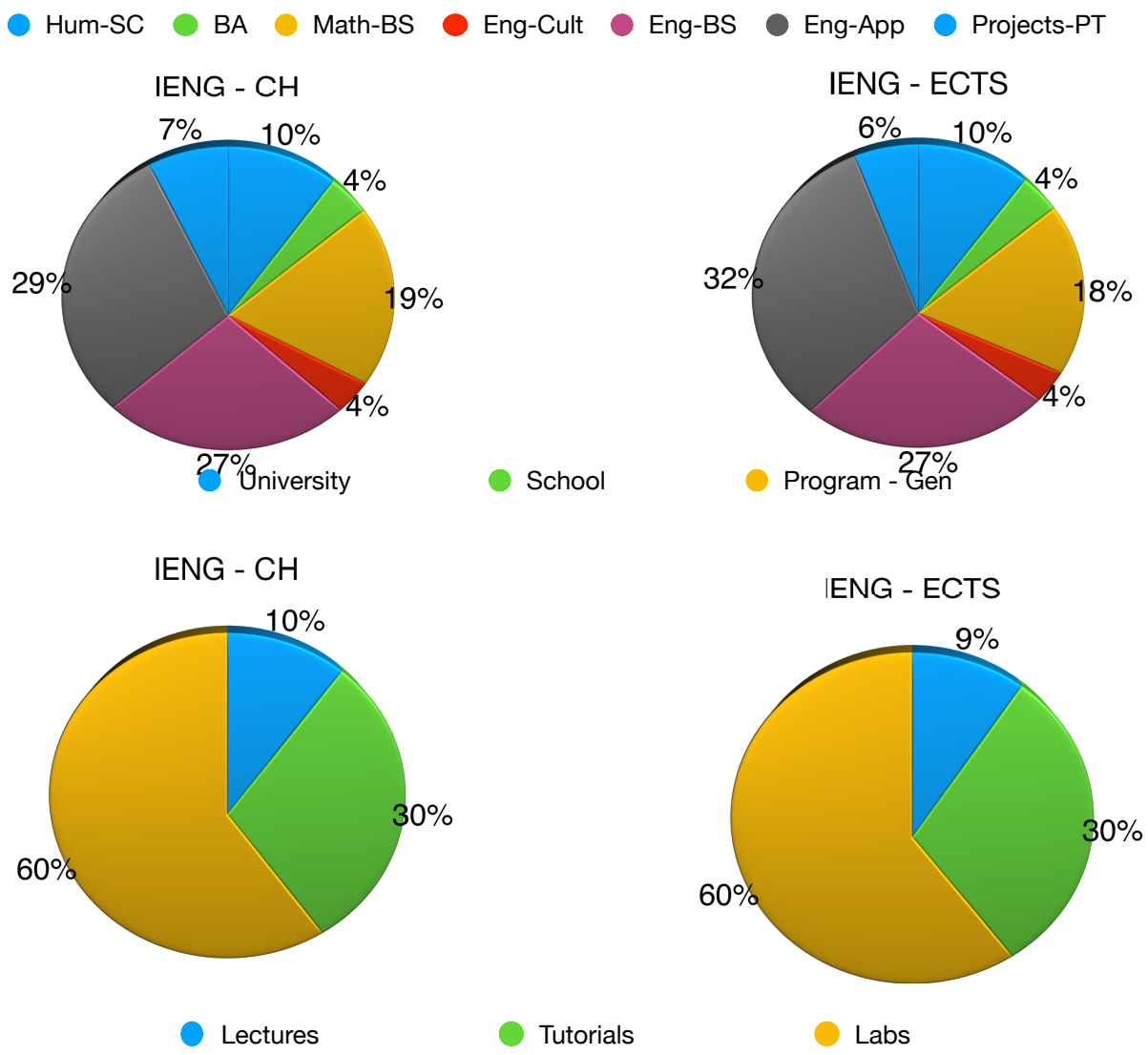
برنامج الهندسة الصناعية

اسم البرنامج	الهندسة الصناعية		
اسم التخصصات	لا يوجد		
الكلية	الهندسة والعلوم التطبيقية		
الجامعة	جامعة النيل الأهلية		
عدد ساعات الاتصال	محاضرات	تمارين	معمل
	157.5	54	39
	250.5		
(CH) الساعات المعتمدة	160		
(ECTS) النقاط المعتمدة	270		
عدد المقررات	58		

توزيع المقررات طبقاً لمتطلبات مستويات التعلم		
	CH	ECTS
متطلبات الجامعة	16	25
متطلبات الكلية	48	82
متطلبات التخصص العام	96	163
متطلبات التخصص الدقيق	لا يوجد	

توزيع المقررات طبقاً لفئات المهارات والمعارف		
	CH	ECTS
العلوم الاجتماعية والانسانية	16	25
إدارة الأعمال	6	10
الرياضيات والعلوم الأساسية	29	49
الثقافة الهندسية	6	10
العلوم الهندسية الأساسية	46	78
التطبيقات الهندسية والتصميم	48	80
المشروعات والتدريب الميداني	9	18

بيانات إحصائية:



مادة (1): رسالة البرنامج:

يركز برنامج الهندسة الصناعية على تخريج جيل من المهندسين القادرين على تصميم وتطوير وتشغيل وادارة الأنظمة الصناعية والأنظمة الخدمية بكفاءة بهدف تعظيم الانتاجية وخفض التكاليف ورفع مستوى جودة الانتاج أو الخدمة المقدمة. ويهتم البرنامج بتسليح الخريجين بكافة الوسائل والأدوات الحديثة والمعارف الهندسية الضرورية لتواكب التطور في الأنظمة الصناعية والخدمية على مستوى العالم.

مادة (2): توصيف البرنامج الدراسى:

يتميز البرنامج الدراسي في الهندسة الصناعية بجامعة النيل بالمرونة والشمولية من خلال طرح قاعدة عريضة من المقررات الدراسية للطلاب تشمل العلوم الرياضية والطبيعية والكيمياء والاحصاء وعلوم الحاسب الالي والاقتصاد بالاضافة الي العلوم الهندسية الاساسية الي جانب المقررات المتخصصة في الهندسة الصناعية وتشمل هندسة التشغيل واستخدامات الحاسب الالي وتطبيقاته فيها والقياسات الدقيقة وبحوث العمليات والنمذجة والمحاكاه وتحليل وتصميم مكان العمل والارجونوميا والتخطيط والتحكم في الانتاج و ادارة الجودة و ادارة النظم المتكاملة

مادة (3): أهداف البرنامج:

يهدف البرنامج لتعليم الطلاب الجامعيين المبادئ الأساسية والممارسات الحديثة في مجال الهندسة الصناعية، وتدريب الطلاب على التفكير النقدي والابتكاري، واتقان المنهجية السليمة لحل المشكلات، وتنمية الوعي بدور الهندسة في مجتمع تكنولوجي حديث.

الهدف الرئيسي للبرنامج هو إنتاج وتأهيل خريجين:

1. قادرين على تصميم وتطوير وتنفيذ وتحسين النظم المتكاملة التي تشمل الأشخاص والمواد والمعلومات والمعدات والطاقة،
2. ملمين بالعلاقات الهندسية بين المهام الإدارية، التخطيط، التنظيم والقياد، والمتابعة والعناصر البشرية في منظومات الإنتاج والبحث والخدمات،
3. قادرين على التعامل مع العناصر التكنولوجية المتكاملة في المشاريع التجارية من أجل القدرة على المنافسة والاستدامة،

هذا ويهدف البرنامج إلى توفير علاقات قوية بين القطاعات الاقتصادية المحلية والمجتمعات الصناعية مع خريجي البرنامج في المجالات المتعلقة بالبحث والتدريب العملي والتحقيقات الميدانية والتأكيد على تقييم المخاطر وأثر القرارات المتعلقة بالقرارات الاقتصادية والعملية في القطاعات الصناعية والخدمية.

هذا مع فهم أهمية السلامة والتنمية الاقتصادية والبيئية المستدامة وتحسين مستوى المعيشة وفهم عميق لقيمة الابتكار وريادة الأعمال وخلق مشاريع جديدة.

ويتم تحقيق هذه الأهداف من قبل أعضاء هيئة التدريس في الهندسة الصناعية ذوي الخبرة في إدارة الأنشطة الهندسية والتقنية.

مادة (4): مواصفات الخريج:

المخرج الرئيسى للبرنامج المقترح هو جيل من المهندسين المتخصصين فى الهندسة الصناعية بحيث يكون الخريج قادراً على:

1. تصميم وتطوير وتنفيذ وتحسين النظم المتكاملة التي تشمل الناس والمواد والمعلومات والمعدات والطاقة.

2. فهم العلاقات الهندسية بين المهام الإدارية للتخطيط والتنظيم والقيادة والمراقبة والعناصر البشرية في منظمات الإنتاج والبحث والخدمات.
3. فهم والتعامل مع تكامل نظم الإدارة في سلسلة من البيئات التكنولوجية المختلفة.
4. توفير علاقات قوية بين القطاعات الاقتصادية المحلية والمجتمعات الصناعية مع خريجي البرنامج في المجالات المتعلقة بالبحث والتدريب العملي والتحقيقات الميدانية.
5. تقييم المخاطر وأثر عدم اليقين المرتبط بالقرارات الاقتصادية والعملية في القطاعات الصناعية والخدمية.
6. التأكيد على الأدوار الرئيسية لأبعاد السلامة ، والتكنولوجيا المستدامة ، التوافق البيئي ، وتدابير الإنتاج الأنظف في التصنيع والمواد والبدائل الإدارية والاقتصادية.

مادة (5): جدارات خريج البرنامج / Program Graduate Competencies:

(Industrial Engineering ARS / **C_{M-IE}- Level** Competencies)

برنامج الهندسة الصناعية في جامعة النيل الأهلية يتبع مباشرة كلية الهندسة والعلوم التطبيقية ولا يعتبر تخصص من تخصصات الهندسة الميكانيكية (سواء إدارياً أو أكاديمياً) وقد تم تصميمه بشكل تندمج فيه مجالات التصنيع والانتاج - إدارة الانتاج - التنظيم الصناعي في شكل مميز يكون الخريج فيه قادراً على تحقيق (**A-Level** Competencies + **U-Level** Competencies). وقد تم استطلاع العديد من الجامعات الأمريكية والتي تطرح برامج مشابهة وكذلك هيئة ABET مما تبين أنه من الضروري استبدال B-Level Competencies والمخصصة للهندسة الميكانيكية بجدارات متناسبة مع طبيعة البرنامج ومشابهة إلى» درجة كبيرة تلك التي يتمتع بها الخريجون من كبرى الجامعات الأمريكية والمعتمدة من ABET. وعليه سيتم استخدام **B_{IE}-Level** competencies بدلاً عن **B-Level** competencies الخاصة بالهندسة الميكانيكية والموصفة من قبل هيئة ضمان الجودة والاعتماد على النحو التالي:

B-IE Level Competencies for Industrial Engineering Graduates-

B_{IE} (1)	Apply the acquired technical or managerial skills in a commercial or industrial environment.
B_{IE}(2)	Solve manufacturing and service industry technical/management problems utilizing industrial engineering knowledge such as production planning and control, production scheduling, quality engineering, and inventory management.
B_{IE}(3)	Implement appropriate computer-based support tools for problem-solving and analysis.
B_{IE}(4)	Solve a wide range of problems related to the analysis, design, and construction of industrial and service systems.
B_{IE}(5)	Analyze and model problems presented by industrial entities.

مادة (6): تفاعل البرنامج مع احتياجات السوق:

من الأهداف الرئيسية للبرنامج المقترح هو التفاعل المستمر مع احتياجات سوق العمل حيث أن ذلك السوق هو ما يمثل المستهلك الحقيقى وتماشياً مع نظام الجودة الشاملة فإن مخرجات البرنامج لابد وأن تتوافق مع متطلبات المستهلك وعليه فإن الجامعة ملتزمة بالتواصل مع الغرف التجارية والصناعية والممثلة للمجتمع الصناعى والخدمي للتعرف على

الاحتياجات الحقيقية للخريجين من البرنامج وكذلك لتشكيل قنوات مستمرة لتدريب الطلاب فى تلك المصانع والخدمات.لقد تم تصميم البرنامج ليتوافق مع ما يشهده العصر من إحتياج لتطبيق أنظمة زيادة الإنتاجية مع المحافظة على المواصفات العالمية مع الحفاظ على سعر إنتاجى ملائم.

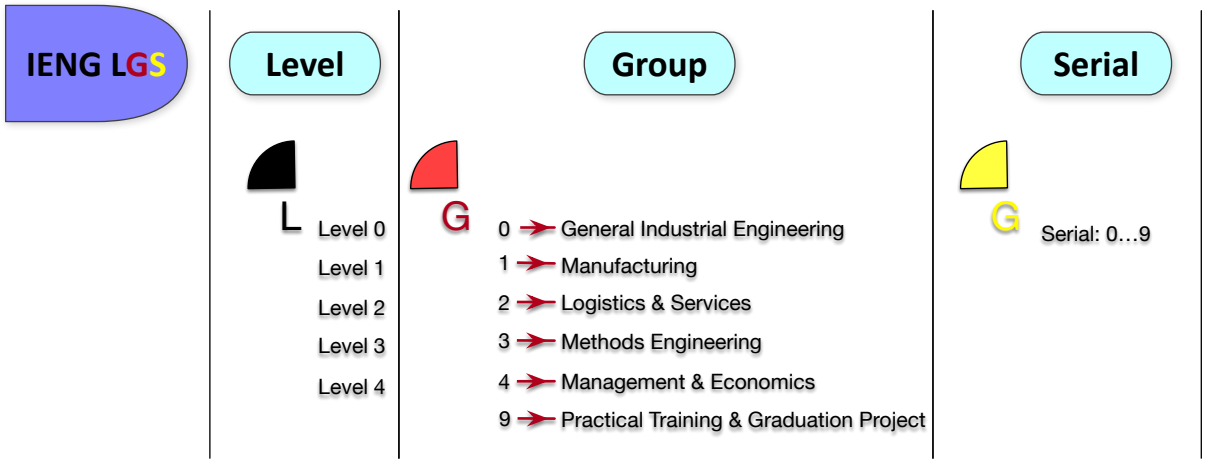
مادة (7): التشابه والتمايز عن البرامج المشابهة:

يقدم البرنامج نموذجاً للإسلوب المنهجى فى التعليم الجامعى فى تخصص الهندسة الصناعيةحيث يستفيد البرنامج من الخبرات المتراكمة فى البرامج المشابهة على المستوى المحلى والمستوى الدولى لتقديم برنامج دراسى يعتمد على:

1. توفير الأساس النظرى المناسب للتخصص بما يواكب ما يتم تدريسه فى الجامعات العريقة محلياً وعالمياً وينقسم هذا إلى شقين أساسيين:
   - تقديم الأساس النظري الذى يخدم فئة المهندسين الصناعيين بصفة عامة لتكوين الأرضية الثابتة للتقدم فى علوم التخصص.
   - تقديم الأساس النظري والذى يرتفع بمستوى الطلاب إلى مستوى التخصص معتمداً على دراسة لما يتم تدريسه بالأقسام المماثلة فى مصر وخارجها.
2. توفير نظام الساعات المعتمدة والذى يتيح للطلبة الإختيار من مجموعة من المقررات.
3. توفير معامل متكاملة للتطبيقات العملية المصاحبة للدراسة النظرية.
4. توفير خطة تدريب عملى داخل وخارج الجامعة لتتماشى مع متطلبات المقررات الدراسية والتطور المستمر فى إحتياجات السوق.

مادة (8): تصميم كود المقررات في برنامج الهندسة الصناعية:

تم تصميم كود المقررات في برنامج الهندسة الصناعية ليتوافق مع نظام تكويد المقررات في جامعة النيل والمتوافق مع توصيات لجنة قطاع التعليم الهندسي بحيث يميز الرقم الثاني من الشق العددي من كود المقرر المجال الدقيق في البرنامج على النحو التالي:



مادة (9): المقررات الدراسية ومدى ملاءمتها لمخرجات البرنامج المستهدفة:

وللحصول على درجة بكالوريوس العلوم في الهندسة الصناعية ولتحقيق مخرجات التعلم المستهدفة للبرنامج وللتوافق مع قدرات وجدارات الخريج الموصفة من قبل هيئة ضمان الجودة والاعتماد لتخصص Mechanical Engineer فإنه يتعين على الطالب أن يجتاز بنجاح المقررات التالية المقسمة إلى مستويات (متطلبات الجامعة - متطلبات الكلية - متطلبات التخصص).

IENG University Core Requirements (10 courses = 16 CR)

Code No.	Course Title	No. of hours / week			CH	ECTS	SW L	جدارات
		Lec	Tut	Lab				
ENGL 001	Intensive English	0	0	0	0	0	0	U2
ENGL 002	English I	0	0	0	0	0	50	U2
ENGL 003	English II	0	0	0	0	0	50	U2
ENGL 101	Writing Skills	4.5	0	0	3	5	125	U2
ENGL 102	Communication and Presentation Skills	4.5	0	0	3	5	125	U2
HUMA 001	Introduction to Scientific & Critical Thinking	3	0	0	2	3	75	U3
HUMA 002	Introduction to Ethics	3	0	0	2	3	75	U4
HUMA 003	Selected Topics in Humanities & Arts	3	0	0	2	3	75	U1 U5
SSCI 001	Selected Topics in Social Sciences	3	0	0	2	3	75	U1 U5 U6

SSCI 002	Selected Topics in World Cultures and Diversity	3	3	0	2	3	75	U1 U6
Total Number of Credits	**10**	**24**	**3**	**0**	**16**	**25**	**725**	

IENG Engineering Core Requirements (16 courses = 48 CR)

Code No.	Course Title	No. of hours / week			CH	ECTS	SWL	جدارات
		Lec	Tut	Lab				
CHEM 001	Chemical Principles	3	0	1.5	3	5	125	A1 A2 A4
CSCE 001	Computer & Information Skills	1.5	0	4.5	3	5	125	A1 A10
CSCE 002	Introduction to Programming	1.5	0	4.5	3	5	125	A1 A6 A10
ECEN 101	Electric Circuits	3	0	1.5	3	5	125	A1 A3 A5 A6 A9 A10
ENGR 001	Introduction to Engineering	1.5	0	3	3	5	125	A2 A3 A5 A6 A7
ENGR 002	Introduction to Engineering Design	1.5	0	3	3	5	125	A2 A3 A6 A7 A9
MATH 001	Analytical Geometry & Calculus I	3	1.5	0	3	5	125	A1 A4 A7 A8 A10
MATH 002	Calculus II	3	1.5	0	3	5	125	A1 A2 A5 A7 A8 A10
MATH 103	Probability & Statistics for Engineers	3	1.5	0	3	5	125	A3 A4 A6 A8 A9
MATH 104	Linear Algebra	3	1.5	0	3	5	125	A1 A3 A6 A7 A8
MATH 205	Differential Equations	3	1.5	0	3	5	125	A2 A4 A5 A7 A9 A10
MATH 206	Nummerical Methods	3	1.5	0	3	5	125	A1 A2 A4 A6 A8 A10
MENG 101	Engineering Mechanics I - Statics	3	0	0	2	4	100	A1 A2
MENG 102	Engineering Mechanics II - Dynamics	3	0	0	2	4	100	A1 A2
PHYS 001	Physics I	3	1.5	1.5	4	7	175	A1 A3 A4 A7 A8 A10
PHYS 002	Physics II	3	1.5	1.5	4	7	175	A1 A2 A4 A5 A6 A9
Total Number of Credits	**16**	**42**	**12**	**21**	**48**	**82**	**2050**	

IENG Program Requirements (32 courses - 96 CH)

Code No.	Course Title	No. of hours / week			CH	ECTS	SWL	جدارات
		Lec	Tut	Lab				
ENTR 301	Selected Topics in Entrepreneurship	3	1.5	0	3	5	125	A6 A7 A9 B1
IENG 101	Introduction to Industrial and Service Engineering	1.5	3	0	2	4	100	B2 B5
IENG 111	Introduction to Material Science	3	0	1.5	3	5	125	A1 A2 A3 B2 B3 B4
IENG 202	Operations Research I	3	1.5	1.5	3	5	125	A2 A3 B5
IENG 212	Manufacturing Processes 1	3	1.5	1.5	3	5	125	B1 B2 B3
IENG 213	Manufacturing Processes 2	3	1.5	1.5	3	5	125	B4 B5
IENG 231	Safety Engineering	3	1.5	0	3	5	125	A4 B4
IENG 232	Work System Analysis and Design	3	1.5	0	3	5	125	B4
IENG 233	Human Factors Engineering	3	1.5	1.5	3	5	125	A9 A10
IENG 241	Engineering Economics	3	1.5	0	3	5	125	B3 B4
IENG 242	Operations Management	3	1.5	0	3	5	125	B3 B4
IENG 243	Statistical Quality Control	3	1.5	1.5	3	5	125	A4 B2 B5
IENG 303	Facilities Planning	3	1.5	0	3	5	125	A5
IENG 304	Modeling and Simulation	3	0	1.5	3	5	125	A2 A3 B3
IENG 305	Management Information Systems	3	1.5	0	3	5	125	A6 A7 B3
IENG 314 / MENG 463	CAD/CAM	3	1.5	1.5	3	5	125	B4
IENG 315	Manufacturing Systems	3	1.5	1.5	3	5	125	B4
IENG 322	Logistics and Supply Chain Management	3	1.5	0	3	5	125	A5 A6 B3 B5
IENG 324	Warehouse Science and Operations	3	1.5	0	3	5	125	A5 B3 B5
IENG 344	Project Management	3	1.5	0	3	5	125	A6 B1 B5
IENG 391	Practical Training	0	0	0	3	6	150	A10 B4 B5
IENG 406	Object Oriented Modeling of Industrial Systems	3	0	3	4	6	150	A4 A6 A9 A10 B3 B5
IENG 408	Information and Decision Support	3	1.5	0	3	5	125	A6 A7 B3

Code No.	Course Title	No. of hours / week			CH	ECTS	SWL	جدارات
		Lec	Tut	Lab				
IENG 421	Fundamentals of Service Engineering and Management	3	1.5	0	3	5	125	B2 B4 B5
IENG 493	Graduation Project I	3	0	0	3	6	180	A3 A5 A10 B4 B5
IENG 495	Graduation Project II	3	0	0	3	6	180	A3 A5 A10 B4 B5
MENG 202	Solid Modeling and Workshop	3	0	1.5	3	5	125	A2 A10
NSCI 102	Selected Topics in Environmental Science	3	1.5	0	3	5	125	A3 A7 A10
IENG xxx	Elective (1)	3	1.5	0	3	5	150	From list below
IENG xxx	Elective (2)	3	1.5	0	3	5	150	From list below
IENG xxx	Elective (3)	3	1.5	0	3	5	150	From list below
IENG xxx	Elective (4)	3	1.5	0	3	5	150	From list below
Total Number	**32**	**91.5**	**39**	**18**	**96**	**163**	**4235**	

IENG list of Electives

Code No.	Course Title	No. of hours / week			CH	ECTS	SWL	جدارات
		Lec	Lab	Tut				
IENG 345	Engineering Cost Analysis	3	1.5	0	3	5	125	B3 B4
IENG 346	Introduction to Entrepreneurship and Small Business Management	3	1.5	0	3	5	125	A3 A7 A9 A10
IENG 402	Operations Research II	3	0	1.5	3	5	125	A2 A3 B5
IENG 407	Systems Engineering	3	1.5	0	3	5	125	B4
IENG 409	Selected Topics in Industrial Engineering	3	1.5	0	3	5	125	B3 B5
IENG 416	Product Realization and Reverse Engineering	3	1.5	0	3	5	125	B1 B2 B3 B4 B5
IENG 417	Metrology and Precision Measurements	3	0.75	0.75	3	5	125	B3 B5
IENG 423	Operations Management in Service Industries	3	1.5	0	3	5	125	B2 B4 B5
IENG 425	Industrial Distribution Systems	3	1.5	0	3	5	125	A5 A6 B3 B5
IENG 434	Reliability Engineering	3	1.5	0	3	5	125	A2 B2 B4 B5
IENG 435	Maintenance Planning	3	1.5	0	3	5	125	A4 B2
IENG 447	Design of Experiments	3	1.5	0	3	5	125	B1 B3 B4
IENG 448	Introduction to MOT	3	1.5	0	3	5	125	A7 A8 A9 A10
MENG 204	Mechanical Measurements	3	0.75	0.75	3	5	125	B1 B3
MENG 304	Thermodynamics I	1.5	1.5	1.5	2	3	75	B1 B2 B5
MENG 305	Fluid Mechanics I	3	0.75	0.75	3	5	125	B2 B4
MENG 323	Fundamentals of Mechatronics Engineering	3	1.5	0	3	5	125	B1 B3 B5

مادة (9): توزيع مقررات البرنامج على الفئات المقترحة في (NARS):

IENG Course Mapping to Subject Categories (NARS)

Course Code	Course Title	Hum. & Social Sci.		Business Admin.		Math & Basic Sci.		Eng. Culture		Basic Eng. Sci.		Eng. App. & Design		Project & PT	
		CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS
	University Requirements														
ENGL 001	Intensive English														
ENGL 002	English I	0	0												
ENGL 003	English II	0	0												
ENGL 101	Writing Skills	3	5												
ENGL 102	Communication and Presentation Skills	3	5												
HUMA 001	Introduction to Scientific & Critical Thinking	2	3												
HUMA 002	Introduction to Ethics	2	3												
HUMA 003	Selected Topics in Humanities & Arts	2	3												
SSCI 001	Selected Topics in Social Sciences	2	3												
SSCI 002	Selected Topics in World Cultures and Diversity	2	3												
	Total University Requirements	**16**	**25**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Engineering Requirements														
CHEM 001	Chemical Principles					3	5								
CSCE 001	Computer & Information Skills									3	5				
CSCE 002	Introduction to Programming									3	5				
ECEN 101	Electric Circuits									3	5				
ENGR 001	Introduction to Engineering							3	5						
ENGR 002	Introduction to Engineering Design									3	5				
MATH 001	Analytical Geometry & Calculus I					3	5								
MATH 002	Calculus II					3	5								
MATH 103	Probability & Statistics for Engineers					3	5								
MATH 104	Linear Algebra					3	5								
MATH 205	Differential Equations					3	5								
MATH 206	Nummerical Methods					3	5								
MENG 101	Engineering Mechanics I - Statics									2	4				
MENG 102	Engineering Mechanics II - Dynamics									2	4				
PHYS 001	Physics I					4	7								
PHYS 002	Physics II					4	7								
	Total Engineering Requirements	**0**	**0**	**0**	**0**	**29**	**49**	**3**	**5**	**16**	**28**	**0**	**0**	**0**	**0**
	Program Requirements														
ENTR 301	Selected Topics in Entrepreneurship			3	5										
IENG 101	Introduction to Industrial and Service Engineering											2	4		
IENG 111	Introduction to Material Science									3	5				
IENG 202	Operations Research I									3	5				
IENG 212	Manufacturing Processes 1											3	5		
IENG 213	Manufacturing Processes 2											3	5		
IENG 231	Safety Engineering									3	5				
IENG 232	Work System Analysis and Design											3	5		
IENG 233	Human Factors Engineering											3	5		
IENG 241	Engineering Economics			3	5										
IENG 242	Operations Management									3	5				
IENG 243	Statistical Quality Control											3	5		
IENG 303	Facilities Planning											3	5		
IENG 304	Modeling and Simulation									3	5				
IENG 305	Management Information Systems									3	5				

Course Code	Course Title	Hum. & Social Sci.		Business Admin.		Math & Basic Sci.		Eng. Culture		Basic Eng. Sci.		Eng. App. & Design		Project & PT	
		CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS	CH	ECTS
IENG 314 / MENG 463	CAD/CAM											3	5		
IENG 315	Manufacturing Systems									3	5				
IENG 322	Logistics and Supply Chain Management											3	5		
IENG 324	Warehouse Science and Operations											3	5		
IENG 344	Project Management									3	5				
IENG 391	Practical Training													3	6
IENG 406	Object Oriented Modeling of Industrial Systems											4	6		
IENG 408	Information and Decision Support									3	5				
IENG 421	Fundamentals of Service Engineering and Management											3	5		
IENG 493	Graduation Project I													3	6
IENG 495	Graduation Project II													3	6
IENG xxx	Elective (1)											3	5		
IENG xxx	Elective (2)											3	5		
IENG xxx	Elective (3)											3	5		
IENG xxx	Elective (4)											3	5		
MENG 202	Solid Modeling and Workshop									3	5				
NSCI 102	Selected Topics in Environmental Science							3	5						
	Total Program Requirements	**0**	**0**	**6**	**10**	**0**	**0**	**3**	**5**	**30**	**50**	**48**	**80**	**9**	**18**
	TOTAL IENG	**16**	**25**	**6**	**10**	**29**	**49**	**6**	**10**	**46**	**78**	**48**	**80**	**9**	**18**
	Course Category %	**10.0%**		**3.8%**		**18.1%**		**3.8%**		**28.8%**		**30.0%**		**5.6%**	

مادة (10): مصفوفة مخرجات المقررات الدراسية ومدى ملاءمتها للمخرجاتها المستهدفة للبرنامج:

IENG (University Requirements - Engineering Requirements) Course-Competency Matrix

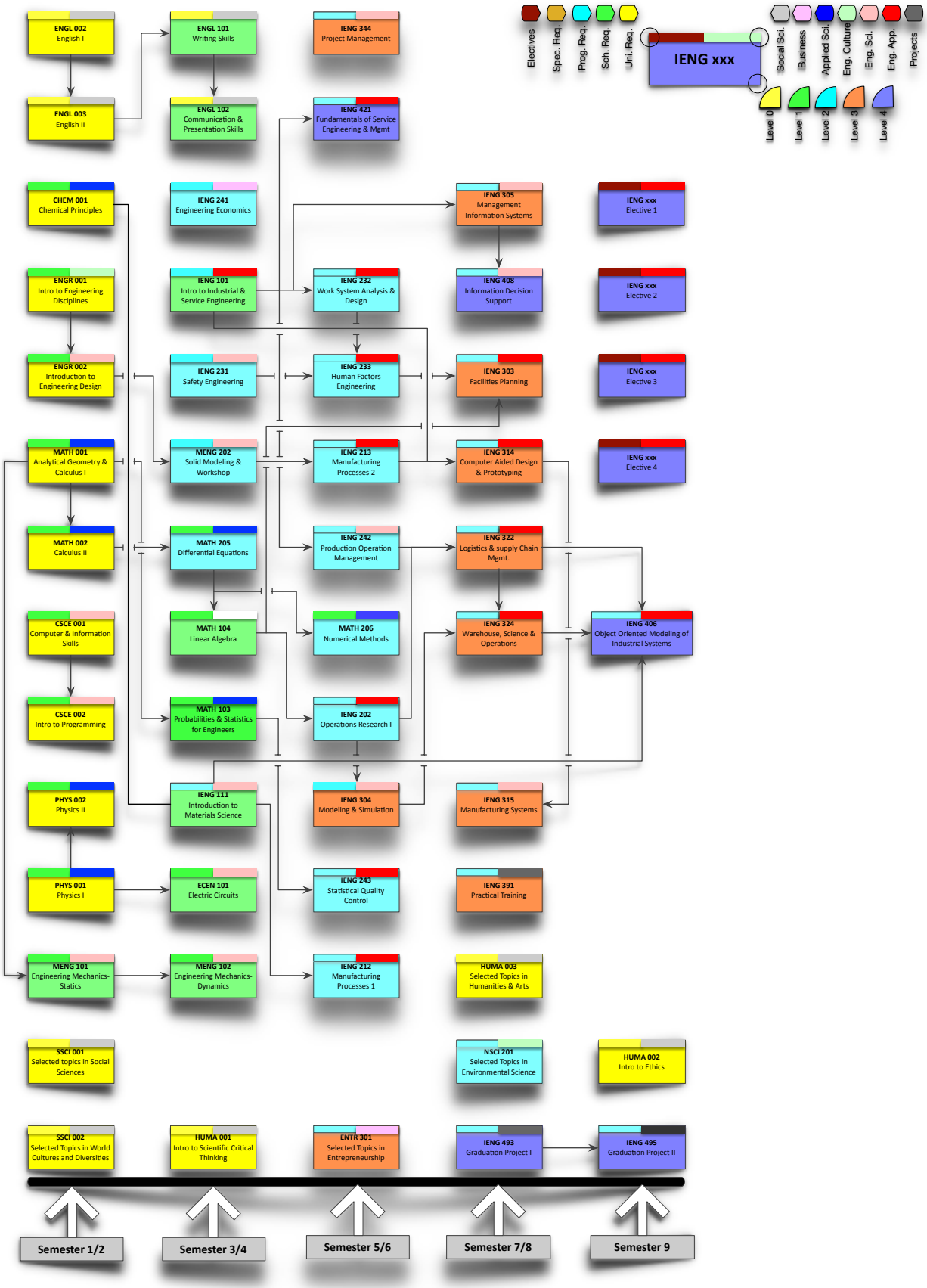
		U1	U2	U3	U4	U5	U6	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
		Uni. (U-Level) Competencies						Eng. (A-Level) Competencies									
	University Requirements																
ENGL 001	Intensive English		x														
ENGL 101	English 101		x														
ENGL 102	English 102		x														
ENGL 201	Writing Skills		x														
ENGL 202	Communication & Presentation Skills		x														
HUMA 101	Introduction to Scientific Critical Thinking			x													
HUMA 102	Introduction to Ethics				x												
HUMA 103	Selected Topics in Humanities & Arts	x				x											
SSCI 101	Selected Topics in Egyptian & Arab Heritage	x				x	x										
SSCI 102	Selected Topics in Social Sciences	x					x										
	School Requirements																
CHEM 001	Chemical Principles							x	x		x						
CSCE 001	Computer & Information Skills							x									x
CSCE 002	Introduction to Programming							x					x				x
ECEN 101	Electric Circuits							x		x		x	x			x	x
ENGR 001	Introduction to Engineering								x	x		x	x	x			
ENGR 002	Introduction to Engineering Design								x	x			x	x		x	
MATH 001	Analytical Geometry & Calculus I							x			x			x	x		x
MATH 002	Calculus II							x	x			x		x	x		x
MATH 103	Probability & Statistics for Engineers									x	x		x		x	x	
MATH 104	Linear Algebra							x		x			x	x	x		
MATH 205	Differential Equations								x		x	x		x		x	x
MATH 206	Nummerical Methods							x	x		x		x		x		x
MENG 101	Engineering Mechanics I - Statics							x	x								
MENG 102	Engineering Mechanics II - Dynamics							x	x								
PHYS 001	Physics I							x		x	x			x	x		x
PHYS 002	Physics II							x	x		x	x	x			x	

IENG Course - Competencies matrix

IENG program		U1	U2	U3	U4	U5	U6	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5
		Uni. Competencies (U-Level)						Eng. Competencies (A-Level)										Industrial Eng. ($C_{M\text{-}IE}$ Level)				
	Program Requirements																					
ENTR 301	Selected Topics in Entrepreneurship												x	x		x		x				
IENG 101	Introduction to Industrial and Service Engineering																		x			x
IENG 111	Introduction to Material Science							x	x	x									x	x	x	
IENG 202	Operations Research I								x	x												x
IENG 212	Manufacturing Processes 1																	x	x	x		
IENG 213	Manufacturing Processes 2																				x	x
IENG 231	Safety Engineering										x										x	
IENG 232	Work System Analysis and Design																				x	
IENG 233	Human Factors Engineering															x	x					
IENG 241	Engineering Economics																			x	x	
IENG 242	Operations Management																			x	x	
IENG 243	Statistical Quality Control										x								x			x
IENG 303	Facilities Planning											x										
IENG 304	Modeling and Simulation								x	x										x		
IENG 305	Management Information Systems												x	x						x		
IENG 314 / MENG 463	CAD/CAM																				x	
IENG 315	Manufacturing Systems																				x	
IENG 322	Logistics and Supply Chain Management											x	x							x		x
IENG 324	Warehouse Science and Operations											x								x		x
IENG 344	Project Management												x					x				x
IENG 391	Practical Training																x				x	x
IENG 406	Object Oriented Modeling of Industrial Systems										x		x			x	x			x		x
IENG 408	Information and Decision Support												x	x						x		
IENG 421	Fundamentals of Service Engineering and Management																		x		x	x
IENG 493	Graduation Project I									x		x					x				x	x
IENG 495	Graduation Project II									x		x					x				x	x
MENG 202	Solid Modeling and Workshop								x								x					
NSCI 102	Selected Topics in Environmental Science									x				x			x					
	Electives																					
IENG 345	Engineering Cost Analysis																			x	x	
IENG 346	Introduction to Entrepreneurship and Small Business Management									x				x		x	x					
IENG 402	Operations Research II								x	x												x
IENG 407	Systems Engineering																				x	
IENG 409	Selected Topics in Industrial Engineering																			x		x
IENG 416	Product Realization and Reverse Engineering																	x	x	x	x	x
IENG 417	Product Realization and Reverse Engineering																			x		x
IENG 423	Operations Management in Service Industries																		x		x	x
IENG 425	Industrial Distribution Systems											x	x							x		x
IENG 434	Reliability Engineering								x										x		x	x
IENG 435	Maintenance Planning										x								x			
IENG 447	Design of Experiments																	x		x	x	
IENG 448	Introduction to MOT													x	x	x	x					
MENG 204	Mechanical Measurements																	x		x		
MENG 304	Thermodynamics I																	x	x			x
MENG 305	Fluid Mechanics I																		x		x	
MENG 323	Fundamentals of Mechatronics Engineering																	x		x		x
COUNT		0	0	0	0	0	0	1	6	8	4	6	7	6	1	5	9	8	11	18	19	21

Course Dependency Flow Diagram

IENG Sample Study Plan



IENG Study Plan (Year 1)

	Semester 1						
Code	**Title**	**CH**	**ECTS**	**SWL**	**Prerequisite**		
CHEM 001	**Chemical Principles**	3	5	125	None		
CSCE 001	**Computer & Information Skills**	3	5	125	None		
ENGL 002	**English I**	0	0	50	A minimum score of 500 on the TOEFL. Students will also be required to pass a written NU test (essay).		
ENGR 001	**Introduction to Engineering**	3	5	125	None		
MATH 001	**Analytical Geometry & Calculus I**	3	5	125	None		
PHYS 001	**Physics I**	4	7	175	None		
SSCI 001	**Selected Topics in Social Sciences**	2	3	75	None		
TOTAL		**18**	**30**	**800**			
	Semester 2						
CSCE 002	**Introduction to Programming**	3	5	125	CSCE 001 - Computer & Information Skills		
ENGL 003	**English II**	0	0	50	ENGL 002 - English I		
ENGR 002	**Introduction to Engineering Design**	3	5	125	ENGR 001 - Introduction to Engineering		
MATH 002	**Calculus II**	3	5	125	MATH 001 - Analytical Geometry & Calculus I		
MENG 101	**Engineering Mechanics I - Statics**	2	4	100	MATH 001 - Analytical Geometry & Calculus I		
PHYS 002	**Physics II**	4	7	175	PHYS 001 - Physics I		
SSCI 002	**Selected Topics in World Cultures and Diversity**	2	3	75	None		
TOTAL		**17**	**29**	**775**			

IENG Study Plan (Year 2)

	Semester 3						
Code	Title	CH	ECTS	SWL	Prerequisite		
ENGL 101	**Writing Skills**	3	5	125	ENGL 003 - English II - or IELTS 6.5 or equivalent		
HUMA 001	**Introduction to Scientific & Critical Thinking**	2	3	75	None		
IENG 101	**Introduction to Industrial and Service Engineering**	2	4	100	None		
MATH 103	**Probability & Statistics for Engineers**	3	5	125	MATH 002 - Calculus II		
MATH 205	**Differential Equations**	3	5	125	MATH 002 - Calculus II		
MENG 102	**Engineering Mechanics II - Dynamics**	2	4	100	MENG 101 - Engineering Mechanics I - Statics		
MENG 202	**Solid Modeling and Workshop**	3	5	125	ENGR 002 - Introduction to Engineering Design		
TOTAL		**18**	**31**	**775**			
	Semester 4						
ECEN 101	**Electric Circuits**	3	5	125	PHYS 001 - Physics I		
ENGL 102	**Communication and Presentation Skills**	3	5	125	ENGL 101 - Writing Skills		
IENG 111	**Introduction to Material Science**	3	5	125	None		
IENG 231	**Safety Engineering**	3	5	125	None		
IENG 241	**Engineering Economics**	3	5	125	None		
MATH 104	**Linear Algebra**	3	5	125	MATH 002 - Calculus II		
TOTAL		**18**	**30**	**750**			

IENG Study Plan (Year 3)

	Semester 5						
Code	Title	CH	ECTS	SWL	Prerequisite		
ENTR 301	**Selected Topics in Entrepreneurship**	3	5	125	NONE		
IENG 202	**Operations Research I**	3	5	125	MATH 104 - Linear Algebra		
IENG 212	**Manufacturing Processes 1**	3	5	125	IENG 111 - Introduction to Material Science		
IENG 232	**Work System Analysis and Design**	3	5	125	None		
IENG 242	**Operations Management**	3	5	125	None		
MATH 206	**Nummerical Methods**	3	5	125	MATH 205 - Differential Equations		
TOTAL		**18**	**30**	**750**			
	Semester 6						
IENG 213	**Manufacturing Processes 2**	3	5	125	MENG 202 - Solid Modeling and Workshop		
IENG 233	**Human Factors Engineering**	3	5	125	IENG 231 - Safety Engineering	IENG 232 - Work System Analysis and Design	
IENG 243	**Statistical Quality Control**	3	5	125	MATH 103 - Probability & Statistics for Engineers		
IENG 304	**Modeling and Simulation**	3	5	125	MATH 103 - Probability & Statistics for Engineers	IENG 202 - Operations Research I	
IENG 344	**Project Management**	3	5	125	None		
IENG 421	**Fundamentals of Service Engineering and Management**	3	5	125	IENG 101 - Introduction to Industrial and Service Engineering		
TOTAL		**18**	**30**	**750**			

IENG Study Plan (Year 4)

	Semester 7						
Code	Title	CH	ECTS	SWL	Prerequisite		
IENG 314 / MENG 463	**CAD/CAM**	3	5	125	MENG 202 - Solid Modeling and Workshop		
IENG 303	**Facilities Planning**	3	5	125	IENG 202 - Operations Research I	IENG 233 - Human Factors Engineering	
IENG 322	**Logistics and Supply Chain Management**	3	5	125	IENG 202 - Operations Research I	IENG 242 - Operations Management	
IENG 305	**Management Information Systems**	3	5	125	IENG 101 - Introduction to Industrial and Service Engineering		
IENG 391	**Practical Training**	3	6	150	NONE		
NSCI 102	**Selected Topics in Environmental Science**	3	5	125	None		
TOTAL		**18**	**31**	**775**			
	Semester 8						
HUMA 003	**Selected Topics in Humanities & Arts**	2	3	75	None		
IENG 315	**Manufacturing Systems**	3	5	125	IENG 314 / MENG 463 - CAD/CAM		
IENG 324	**Warehouse Science and Operations**	3	5	125	IENG 322 - Logistics and Supply Chain Management		
IENG 408	**Information and Decision Support**	3	5	125	IENG 305 - Management Information Systems		
IENG 493	**Graduation Project I**	3	6	180	Senior Standing		
IENG xxx	**Elective 1**	3	5	125			
TOTAL		**17**	**29**	**755**			

IENG Study Plan (Year 5)

	Semester 9						
Code	Title	CH	ECTS	SWL	Prerequisite		
HUMA 002	**Introduction to Ethics**	2	3	75	None		
IENG 406	**Object Oriented Modeling of Industrial Systems**	4	6	150	IENG 111 - Introduction to Material Science	IENG 304 - Modeling and Simulation	IENG 322 - Logistics and Supply Chain Management
IENG 495	**Graduation Project II**	3	6	180	IENG 493 - Graduation Project I		
IENG xxx	**Elective 2**	3	5	125			
IENG xxx	**Elective 3**	3	5	125			
IENG xxx	**Elective 4**	3	5	125			
TOTAL		**18**	**30**	**780**			

IENG Electives

	Electives					
Code	Title	CH	ECTS	SWL	Prerequisite	
IENG 346	**Introduction to Entrepreneurship and Small Business Management**	3	5	125	IENG 101 - Introduction to Industrial and Service Engineering	
IENG 402	**Operations Research II**	3	5	125	IENG 202 - Operations Research I	
IENG 409	**Selected Topics in Industrial Engineering**	3	5	125	NONE	
IENG 416	**Product Realization and Reverse Engineering**	3	5	125	IENG 315 - Manufacturing Systems	
IENG 417	**Metrology and Precision Measurements**	3	5	125	None	
IENG 423	**Operations Management in Service Industries**	3	5	125	IENG 421 - Fundamentals of Service Engineering and Management	
IENG 345	**Engineering Cost Analysis**	3	5	125	IENG 241 - Engineering Economics	
IENG 407	**Systems Engineering**	3	5	125	IENG 305 - Management Information Systems	
IENG 425	**Industrial Distribution Systems**	3	5	125	IENG 322 - Logistics and Supply Chain Management	
IENG 434	**Reliability Engineering**	3	5	125	ENGR 001 - Introduction to Engineering	ENGR 002 - Introduction to Engineering Design

	Electives					
IENG 435	**Maintenance Planning**	3	5	125	IENG 304 - Modeling and Simulation	
IENG 448	**Introduction to MOT**	3	5	125	Senior standing	
MENG 305	**Fluid Mechanics I**	3	5	125	PHYS 002 - Physics II	MENG 102 - Engineering Mechanics II - Dynamics
MENG 204	**Mechanical Measurements**	3	5	125	PHYS 002 - Physics II	
MENG 323	**Fundamentals of Mechatronics Engineering**	3	5	125	MATH 205 - Differential Equations	

توصيف مقررات برنامج الهندسة الصناعية

(IENG) - ENTR 301

Course Title	**Selected Topics in Entrepreneurship**	
Course Code	**ENTR 301**	
Prerequisites	NONE	
Classification within the curriculum	Compulsory (All Tracks)	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3.0
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topic Category	Business	
Topic Level	Program Requirements	

Description

This course introduces students to the entrepreneurial activity, concentrates on the survival and growth of small and medium enterprises (SMEs) and focuses on the managerial aspects of SMEs when compared to large firms. It addresses the unique challenges faced by family businesses. Topics covered include the benefits and drawbacks of being an entrepreneur, developmental structures and designs, focus development, management during fast growth periods, lack of resources and financing, development of sustainable intangible resources (legitimacy, status, reputation, etc). Other topics related to family business management include ownership, governance and management, succession planning, generational gaps, delegation and control and the role of non-family members.

(IENG) - IENG 101

Course Title	**Introduction to Industrial and Service Engineering**	
Course Code	**IENG 101**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	1.5
	Tutorials	3
	Labs	
	TOTAL	4.5
EG Credit Hours	2	
ECTS	4	
Student Workload (SWL)	100	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
Introduction to the fundamentals of Industrial Engineering; concepts, analysis, and design. Applications of the principles and problems in operations research, systems analysis, manufacturing processes, human factors, facility design, process selection, production processes, quality and operation management

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Turner, W.C., et. Al, 1993, “Introduction to Industrial and System Engineering”, Prentice Hall

(IENG) - IENG 111

Course Title	**Introduction to Material Science**	
Course Code	**IENG 111**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3.0
	Tutorials	
	Labs	1.50
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description

This course provides an introduction to engineering materials and their properties, classes of materials, and their general properties, developments in materials used for various applications over time, types of Bonding: interatomic forces and energies, and there relation to engineering materials' properties, crystal structures and geometry, crystalline imperfections and their effect on mechanical properties, phase diagrams

Lab and Tutorials

The course requires practice in the materials lab

Literature

- W. Smith, "Principals of Materials Science and Engineering", 3rd Ed., McGraw Hill Publishing Co., 1996.
- R. Askeland, "The Science and Engineering of Materials", 5th Ed., PWS Publishing Co., Boston, 1999.

(IENG) - IENG 202

Course Title	**Operations Research I**	
Course Code	**IENG 202**	
Prerequisites	MATH 104 - Linear Algebra	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description
This course introduces the decision making process criteria to students, and differentiates between different decision making environments. Students are given the knowledge and experience of problem solving techniques through using different operations research modeling and solution techniques, for example linear and integer programing, graphical and analytical solution methods. Through practical applications, assignments and the final projects students learn how to utilize suitable tools at different problem solving situations.

Lab and Tutorials
The course requires practice and problem solving training during tutorials, in addition to training on software to solve general OR problems.

Literature-

- Barry Render, Ralph M. Stair, JR, and Michael E. Hanna, “Quantitative Analysis for Management”, 10th Edition, Pearson Prentice Hall, 2009.
- Frederick S. Hillier and Gerald J. Lieberman, Introduction to Operations Research (8th ed.), McGraw Hill, New York (2005).
- Hamdy A. Taha, Operations Research: An Introduction (6th ed.),

(IENG) - IENG 212

Course Title	**Manufacturing Processes 1**	
Course Code	**IENG 212**	
Prerequisites	IENG 111 - Introduction to Material Science	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course examines safety, metrology, and working drawings, gd&t (geometric dimensioning & tolerancing), metal casting & injection molding ,solidification and cooling, feeding systems and risers, sand casting, expendable mold casting, die casting, injection molding, metal forming, fundamentals of metal forming, hot working processes, cold working processes (sheet metal working)

Lab and Tutorials
The course requires practice in mechanical workshop

Literature
- M P Groover, Fundamentals of Modern Manufacturing, ©2007 John Wiley & Sons, Inc.

(IENG) - IENG 213

Course Title	**Manufacturing Processes 2**	
Course Code	**IENG 213**	
Prerequisites	MENG 202 - Solid Modeling and Workshop	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
The course examines material removal, machining operations: turning, milling and drilling, machine tools and machining setups, jigs and fixtures, broaching, sawing, filing, abrasive machining processes, thread and gear manufacturing, additive manufacturing, non traditional processes, mechanical energy processes, electrochemical machining processes, thermal energy processes, chemical machining
powder metallurgy, nems /mems, nanomaterials processes

Lab and Tutorials
The course requires practice in the mechanical workshop

Literature
- E. Paul DeGarmo, J.T. Black, Ronald A. Kohser, 2003,Materials and processes in manufacturing, 7th ed. Macmillan Publishing company

(IENG) - IENG 231

Course Title	**Safety Engineering**	
Course Code	**IENG 231**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description
The focus of the course is on a system engineering approach to safety, causes of accidents, accident analysis and control, techniques used in safety analysis, safety management and organization, risk management, training, human behavioral approach in safety.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Industrial Safety and Health Management; Asfahl, C. Ray, Pearson Prentice Hall, ISBN-13- 142392-4
- Occupational Safety Management and Engineering; Hammer, W, Prentice Hall, ISBN-13-629379-4

(IENG) - IENG 232

Course Title	**Work System Analysis and Design**	
Course Code	**IENG 232**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course includes the methods used in determining the most effective utilization of effort in human activity systems; work methods, analysis and design; micro motion analysis; human and rating factors; predetermined time systems; work samplings; computer-aided time study; learning curves; lean concepts; fundamentals of line balancing; worker compensation.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Motion and Time Study; Design and Measurement of Work; Ralph M. Barnes, 7th Ed., John Wiley & Sons; 1980.

(IENG) - IENG 233

Course Title	**Human Factors Engineering**	
Course Code	**IENG 233**	
Prerequisites	IENG 231 - Safety Engineering	IENG 232 - Work System Analysis and Design
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description

This course focuses on the application of knowledge about human capabilities and limitations to the design of workplaces, work methods and jobs for optimal safety, efficiency, productivity and comfort. Topics include: systems design and task analysis, muscle use and anthropometry, workspace design, activity-related soft tissue disorders, back injuries, shift work, organizational and psychosocial aspects of work, skilled work and mental activity and regulations in ergonomics. Objectives include how to increase awareness of the need for and role of ergonomics in occupational health, to obtain basic knowledge in the application of ergonomic principles to design of industrial workplaces and the prevention of occupational injuries to understand the breadth and scope of occupational ergonomics.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- Introduction to human factors engineering. NY: Longman, Wickens, C. D., Lee, J. D. Liu, Y. & Becker, S. E. G.,

(IENG) - IENG 241

Course Title	**Engineering Economics**	
Course Code	**IENG 241**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Business	
Topics Level	Program Requirements	

Description

The main aim of this course is make the students acquainted with rational meaningful approaches to evaluating economically different (alternatives) investment opportunities while accomplishing given objectives. The course will also provide the students with the required tools and techniques to consider economic and non-economic factors in evaluating a wide range of industrial and business applications.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- Fraser, N. M., Jewkes, E. M., Bernhardt I. & Tajima, M., Global Engineering Economics: Financial Decision Making for Engineers, 4th Edition, Pearson Education, 2009.
- Chan S. Park, Fundamentals of Engineering Economics, 3rd Edition, Pearson Education, ISBN 13:978-0273772910

(IENG) - IENG 242

Course Title	**Operations Management**	
Course Code	**IENG 242**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description
This course focus on operations and productivity concepts – Production control, operation decision making – Systems design, capacity and investment – Functions of inventory and ordering systems-Facility location and layout – Planning for goods and services – Process planning and selection – Forecasting demand – Production-inventory systems, materials requirements planning (MRP), Just-in-time systems Aggregate demand – Aggregate planning and master scheduling.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature
- Stevenson, William, *Operation Management:*, 10th ed., Irwin/McGraw-Hill, 2011

(IENG) - IENG 243

Course Title	**Statistical Quality Control**	
Course Code	**IENG 243**	
Prerequisites	MATH 103 - Probability & Statistics for Engineers	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description

This course provides a historical view of quality, introduction of the concept of Total Quality Management (TQM), Statistical Fundamentals, principles and concepts of statistical quality control, quality improvement tools, control charts for variables, control charts for attributes, choice between attribute and variable control charts, process capability measures, types of attribute acceptance sampling plans, characteristics of acceptance sampling plans, producer consumers relationships, performance of acceptance sampling plans, economics of acceptance sampling plans, standard attribute acceptance sampling plans applications and limitation, and case studies.

Lab and Tutorials

The course requires practice and problem solving training during tutorials, and software training

Literature

- Montgomery, Douglas C., *Statistical Quality Control A Modern Introduction*, Six Edition, 2009, John Wiley & sons, ISBN: 978-0470-23397-9

(IENG) - IENG 303

Course Title	**Facilities Planning**	
Course Code	**IENG 303**	
Prerequisites	IENG 202 - Operations Research I	IENG 233 - Human Factors Engineering
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description

This course covers strategic facilities planning through detailed facilities layout design. Course components include product flow, space and activity relationships, personnel requirements, line-balancing, material handling, and layout. Traditional and contemporary issues in manufacturing and their impact on facilities design including receiving, shipping, warehousing and integration with manufacturing and supporting operations are explored. Facilities planning models and the process of evaluating, selecting, preparing, presenting, and implementing the facilities plans are covered.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- James A. Tompkins, John White, Yavuz A. Bozer, J. M. A. Tanchoco, “Facilities Planning- Wiley

(IENG) - IENG 304

Course Title	**Modeling and Simulation**	
Course Code	**IENG 304**	
Prerequisites	MATH 103 - Probability & Statistics for Engineers	IENG 202 - Operations Research I
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	
	Labs	1.5
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description

This course provides a basic treatment of discrete-event simulation, including the proper collection and analysis of data, the use of analytic techniques, verification and validation of models, and designing simulation experiments. Furthermore, it presents the application of simulation in manufacturing and material handling systems, and service industries.

Lab and Tutorials

The course requires discussion and training on computer tools for simulation

Literature

- Law, E. M.(2007) " Simulation Modeling and Analysis", Fourth Edition, McGraw-Hill, New York.
- Pidd, M. “Computer Simulation in Management Science" Second Edition, John Wiley & Sons, New York (1998).
- B. W. Taylor, “Introduction to management science”, ninth edition, Chapter 14, Prentice Hall, 2007
- Simulation, Computer simulation: modeling and Analysis, International journal of Modeling and Simulation European Journal of operations Research, simulation and Gaming, ACM transactions on Modeling and Computer Simulation.

(IENG) - IENG 305

Course Title	**Management Information Systems**	
Course Code	**IENG 305**	
Prerequisites	IENG 101 - Introduction to Industrial and Service Engineering	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description
This course provides an introduction to Management Information Systems; Importance of information systems to management, hardware, software, input/output devices, file and database, communication, decision support systems and expert systems. MIS planning and development.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Hawryszkiewycz, J. T., Database Analysis and Design, SRA (Science Research Association, Inc.), 1984

(IENG) - IENG 314

Course Title	**CAD/CAM**	
Course Code	**IENG 314 / MENG 463**	
Prerequisites	MENG 202 - Solid Modeling and Workshop	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring (Semester 9)	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
Introduction to CAD/CAM software and hardware. Three-dimensional geometric modelling. Study of types of curves and surfaces. Data capturing, surface fitting, and rapid prototyping techniques. Utilization of interactive computer graphics packages. Utilizing CAD/CAM software to generate G-code, 3D LASER digitizer scanner, 3D printer, FARO arm, and other CAD/CAM peripherals. Project required.

Laboratory
Regular weekly conducted laboratory sessions utilizing CAD/CAM software and hardware peripherals.

Literature
- "CAD, 3D Modeling, Engineering Analysis, and Prototype Experimentation", Jeremy Zheng Li. Springer, 1st edition 2015.
- SolidWorks, User's Guide 2016, Dassault Systèmes.
- Class notes prepared by instructor and uploaded on Moodle.

(IENG) - IENG 315

Course Title	**Manufacturing Systems**	
Course Code	**IENG 315**	
Prerequisites	IENG 314 / MENG 463 - CAD/CAM	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	1.5
	TOTAL	6
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description
This course reflects manufacturers' growing need to integrate computers into their production processes, this course covers the machining fundamentals—as well as Computer Numerical Control programming and operation of Computer Numerical Control (CNC) machine tools with a focus on word address (G and M code) programming for the industry standard Fanuc controllers.

Lab and Tutorials
The course requires practice and problem solving training during tutorials and CNC training

Literature

- Automation, Production Systems, and Computer Integrated Manufacturing, Mikell Groover, Prentice Hall, 2000.
- Computer-Integrated Design and Manufacturing, Nanua Singh, John Wiley & Sons, 1996

(IENG) - IENG 322

Course Title	**Logistics and Supply Chain Management**	
Course Code	**IENG 322**	
Prerequisites	IENG 202 - Operations Research I	IENG 242 - Operations Management
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course covers the major issues in supply chain management, including: definition of a supply chain; role of inventory; advanced production-inventory models; supply contracts; bullwhip effect and information sharing; vendor-managed inventories and other distribution strategies; third-party logistics providers; managing product variety; information technology and supply chain management; international issues.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature
- Sunil Chopra and Peter Meindl “Supply Chain Management Strategy, Planning, And Operation”, Fourth Edition

(IENG) - IENG 324

Course Title	**Warehouse Science and Operations**	
Course Code	**IENG 324**	
Prerequisites	IENG 322 - Logistics and Supply Chain Management	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course covers main issues in warehouse layout, processes, material handling equipment, warehouse information systems, automation, measuring warehouse efficiency, as well as special topics in warehouse management.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- John J. BARTHOLDI, Steven T. HACKMAN, “Warehouse & Distribution Science”, Release 0.95 and 0.1.2

(IENG) - IENG 344

Course Title	**Project Management**	
Course Code	**IENG 344**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description

This course addresses the fundamental of project management, as well as the tools and techniques necessary to manage complex projects. These principles, largely developed and tested on engineering projects, are being successfully applied to projects of all sizes and types within the business world. They are also fully aligned with the industry standard Project Management Book of Knowledge (PMBOK), published by the worldwide Project Management Institute (PMI). The course will enable students to master projects planning, scheduling and estimating; developing approval process, including testing for alternatives; understanding project information and control systems; properly selecting resources, allocation and implementation, and post project evaluation. PERT, CPM

Lab and Tutorials

The course requires practice and problem solving training during tutorials, in addition to software training.

Literature

- Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Harold Kerzner.

(IENG) - IENG 345		
Course Title	**Engineering Cost Analysis**	
Course Code	**IENG 345**	
Prerequisites	IENG 241 - Engineering Economics	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description
The course outlines the fundamentals of pricing and standard cost, factory overhead costs, use of cost analysis for planning and control processes. Introduction to principles of accounting, and the concepts and techniques of cost accounting are covered. Emphasis placed on the application of cost information to the production of manufacturing goods. (Cost Breakdown, structure, feasibility study)

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Cost Analysis and Estimating for Engineering and Management, Ostwald, P. and Mclaren, T., 2004. Pearson Prentice Hall.

(IENG) - IENG 346		
Course Title	**Introduction to Entrepreneurship and Small Business Management**	
Course Code	**IENG 346**	
Prerequisites	IENG 101 - Introduction to Industrial and Service Engineering	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall/Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description

This course consists of three parts. The first part introduces students to the entrepreneurial activity. The second part concentrates on the survival and growth of small and medium enterprises (SMEs) and focuses on the managerial aspects of SMEs when compared to large firms. The third part addresses the unique challenges faced by family businesses. Topics covered include the benefits and drawbacks of being an entrepreneur, developmental structures and designs, focus development, management during fast growth periods, lack of resources and financing, development of sustainable intangible resources (legitimacy, status, reputation, etc). Other topics related to family business management include ownership, governance and management, succession planning, generational gaps, delegation and control and the role of non-family members.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- Entrepreneurship: Successfully Launching New Ventures : Global Edition, 4th Edition, by Bruce R. Barringer and R. Duane Ireland

(IENG) - IENG 391

Course Title	**Practical Training**	
Course Code	**IENG 391**	
Prerequisites	NONE	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall (Semester 7)	
Contact Hours	Lectures	
	Tutorials	
	Labs	
	TOTAL	0
EG Credit Hours	3	
ECTS	6	
Student Workload (SWL)	150	
Topic Category	Projects and Practical Training	
Topic Level	Program Requirements	

Description
A minimum of four weeks of practical training in off-campus sites elected by the program. Students are required to submit a recognition letter from the site where they received their training, in addition, a report and a presentation are submitted as well. Course is a Pass/Fail course.

Lab and Tutorials
Not Applicable

Literature
Not Applicable

(IENG) - IENG 402

Course Title	**Operations Research II**	
Course Code	**IENG 402**	
Prerequisites	IENG 202 - Operations Research I	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	
	Labs	1.5
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
The course covers different mathematical modeling techniques, including, integer programming models and solution techniques, goal programming, non-linear programming and dynamic programming, Markov analysis.

Lab and Tutorials
The course is project based and requires software tools during labs

Literature

- Barry Render, Ralph M. Stair, JR, and Michael E. Hanna, “Quantitative Analysis for Management”, 10th Edition, Pearson Prentice Hall, 2009.
- Frederick S. Hillier and Gerald J. Lieberman, Introduction to Operations Research (8th ed.), McGraw Hill, New York (2005).
- Hamdy A. Taha, Operations Research: An Introduction (6th ed.),

(IENG) - IENG 406

Course Title	**Object Oriented Modeling of Industrial Systems**		
Course Code	**IENG 406**		
Prerequisites	IENG 111 - Introduction to Material Science	IENG 304 - Modeling and Simulation	IENG 322 - Logistics and Supply Chain Management
Classification within the curriculum	Compulsory		
Course Position in Study Plan	Fall		
Contact Hours	Lectures	3	
	Tutorials		
	Labs	3	
	TOTAL	6	
EG Credit Hours	4		
ECTS	6		
Student Workload (SWL)	150		
Topics Category	Engineering Applications		
Topics Level	Program Requirements		

Description

This course introduces the system concept and approach in operation. The course will help students to identify and differentiate between various types of systems, model and analyze various industrial and service systems and processes, system mapping and description using the Unified Modeling Language (UML) and Pseudo coding, and the breakdown and structure of an object oriented system. UML is the modern engineering language to describe a system and serves as an input for software design. Through a set of case studies, students will be trained to analyze and describe software programming requirements of automated machining and processing needed for software coding and human interactive programming.

Lab and Tutorials

This course is project based, where projects are done in groups using UML, and requires software training and practice

Literature

- Systems Analysis and Design with UML 2.0 4th ed

(IENG) - IENG 407		
Course Title	**Systems Engineering**	
Course Code	**IENG 407**	
Prerequisites	IENG 305 - Management Information Systems	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description

Introductory course to systems engineering for undergraduate students that offers traditional design processes to accommodate specific requirements and capabilities, and to match the constantly changing requirements and the introduction of new technologies in a continuing and evolutionary basis.. The content of the course follows typical system design life cycle. It correlates the different disciplines required to deploy and sustain a system for missions in information technology and processing. Topics include system architecture, requirement allocation, performance budgeting and integration and test. It correlates the different activities required to deploy and sustain a system as well as to extend its life cycle.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- Systems Engineering Handbook, Edited by Cecilia Haskins, V3, 2006

(IENG) - IENG 408

Course Title	**Information and Decision Support**	
Course Code	**IENG 408**	
Prerequisites	IENG 305 - Management Information Systems	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Basic Engineering Sciences	
Topics Level	Program Requirements	

Description

This course provides applications of decision support systems in a business environment are studied. Issues pertaining to maintenance of data, construction of models and provision of supporting technology are explored. Students will analyze, design and implement a managerial decision support system using current development tools.

Lab and Tutorials

The course requires practice and problem solving training during tutorials, in addition to software training, also the course is project based and requires discussion during tutorials

Literature

- Simon French, John Maule and Nadia Papamichail, "Decision Behaviour, Analysis and Support", Cambridge University Press; 1 edition (August 31, 2009)

(IENG) - IENG 409		
Course Title	**Selected Topics in Industrial Engineering**	
Course Code	**IENG 409**	
Prerequisites	NONE	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	
Description TThis course aims at introducing students to recent and/or novel topics in industrial engineering that need to be identified in a responsive manner as technology evolve and develop.		
Lab and Tutorials		
Literature		

(IENG) - IENG 416		
Course Title	**Product Realization and Reverse Engineering**	
Course Code	**IENG 416**	
Prerequisites	IENG 315 - Manufacturing Systems	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course provides an introduction to product development with reverse engineering concept – Product development tools – scanning (digitizing) – rapid prototyping – definition of customer needs – product architectures – Product metrics – design for manufactures and assembly – design for environment – case studies

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Product Design: Techniques in Reverse Engineering and New Product Development by K.Otto and K. Wood Prentice Hall, 2001.
- Reverse Engineering: An Industrial Perspective by Raja and Fernandes. Springer-Verlag 2008

(IENG) - IENG 417		
Course Title	**Metrology and Precision Measurements**	
Course Code	**IENG 417**	
Prerequisites	None	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	0.75
	Labs	0.75
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topic Category	Basic Engineering Sciences	
Topic Level	Program Requirements	

Description

This course provide a basis for judgments about process information, quality assurance, and process control,design and proper operation and maintenance of such a product/system are two important aspects. Measurement is a significant source for acquiring very important and necessary data about both these aspects of engineering, without which the function or analysis cannot be performed properly.

Lab and Tutorials

Regular tutorial sessions cover measurements required for assessing the performance of a product/system, performing analysis to ascertain the response to a specific input function, studying some fundamental principle or law of nature, s extract high-quality information regarding the completion of products, working condition, and status of processes in an operational and industrial environment

Literature

Course Textbook: N.V. Raghavendra, L. Krishnamurthy, “Engineering Metrology and Measurements” ,

Oxford University press, 2013

(IENG) - IENG 421

Course Title	**Fundamentals of Service Engineering and Management**	
Course Code	**IENG 421**	
Prerequisites	IENG 101 - Introduction to Industrial and Service Engineering	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description

This course provides an overview of Service Science, Management and Engineering (SSME), introducing a comprehensive set of definitions of services, early definitions and thoughts on services. The impact of services on modern economies, classification of Service Systems, considerations for the management of services, service productivity and innovation, considerations for the use of methods in the services lifecycle from engagement through solutions design and delivery, SSME Challenges and frameworks, Case studies.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- Fitzsimmons, James A., and Mona J. Fitzsimmons, Service Management: Operations, Strategy, and Information Technology, 7th Edition, Irwin/McGraw-Hill, 2011

(IENG) - IENG 423		
Course Title	**Operations Management in Service Industries**	
Course Code	**IENG 423**	
Prerequisites	IENG 421 - Fundamentals of Service Engineering and Management	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course deals with a firm's operations management function, with emphasis on service organizations. It examines critical competitive and strategic issues pertaining to service operations management. A sampling of topics addressed includes service facility design, layout, and location, service quality, managing queues, managing capacity and demand, the service encounter, forecasting and project management. A wide survey of service industries will be studied including healthcare, financial services, consulting, entertainment, hospitality, airlines, higher education, and environmental services.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature
- Service operations management: improving Service Delivery by Robert Johnston, Graham Clark, Micheal Shulver, 4th edition

(IENG) - IENG 425		
Course Title	**Industrial Distribution Systems**	
Course Code	**IENG 425**	
Prerequisites	IENG 322 - Logistics and Supply Chain Management	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description

This course covers the design and analysis of distribution systems of people, processes and technology. The focus is on distribution, warehousing, and material handling. Topics include the various modes of warehousing and distribution, i.e., cross-docking, 3PL and 4PL logistics outsourcing, Vendor Managed Inventories, role of the warehouse in the extended enterprise, warehouse planning, process design, layout, equipment selection, workforce and workplace issues, and financial performance measures.

Lab and Tutorials

The course requires practice and problem solving training during tutorials

Literature

- SATISH K. KAPOOR, PURVA KANSAL, "BASICS OF DISTRIBUTION MANAGEMENT: A LOGISTICS APPROACH", Prentice Hall of India, 2003

(IENG) - IENG 434			
Course Title	**Reliability Engineering**		
Course Code	**IENG 434**		
Prerequisites	ENGR 001 - Introduction to Engineering	ENGR 002 - Introduction to Engineering Design	MATH 103 - Probability & Statistics for Engineers
Classification within the curriculum	Elective		
Course Position in Study Plan	Spring/Fall		
Contact Hours	Lectures	3	
	Tutorials	1.5	
	Labs		
	TOTAL	4.5	
EG Credit Hours	3		
ECTS	5		
Student Workload (SWL)	125		
Topics Category	Engineering Applications		
Topics Level	Program Requirements		

Description
This course introduces students to principles of reliability, failure rate and its relation to reliability, probability distribution of the time to failure, exponential and Weibull distributions, reliability of systems, series and parallel systems, stand by redundancy, systems mean time to failure, mean residual life, reliability in design. Failure mode effect analysis, failure tree analysis, reliability testing analysis, and warranty problems.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- An Introduction to Reliability and Maintainability Engineering, by C. E. Ebeling, McGraw-Hill (1997).
- Planning and Control of Maintenance Systems: Modeling and Analysis, Duffuaa; A. Raouf and J. Campbell, John Wiley & Sons, (1999).

(IENG) - IENG 435		
Course Title	**Maintenance Planning**	
Course Code	**IENG 435**	
Prerequisites	IENG 304 - Modeling and Simulation	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course introduces students to Maintenance and the industrial organization – acquisition policy and maintenance life – cycle costs – maintenance strategy, a business centered approach – the reliability of plant components and systems – determining the life plan and schedule – controlling plant reliability – reliability centered maintenance – enterprise asset management – methods of handling managing maintenance operations in manufacturing and service enterprises.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature

- Duffuaa, S.O. and Raouf, A., Planning and control of maintenance Systems:Modeling and Analysis, John Wiley Inc., 1999

(IENG) - IENG 447		
Course Title	**Design of Experiments**	
Course Code	**IENG 447**	
Prerequisites	IENG 243 - Statistical Quality Control	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course provides a Revision of models of statistical analysis, objectives of design of experiments, single factor designs, several factors designs, 2k factorial design, fractional factorial design, orthogonal array and Taguchi methods, robust design.

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature
- Design and Analysis of Experiments by Douglas Montgomery (7th edition), 2008.

(IENG) - IENG 448		
Course Title	**Introduction to MOT**	
Course Code	**IENG 448**	
Prerequisites	Senior standing	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring/Fall	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topics Category	Engineering Applications	
Topics Level	Program Requirements	

Description
This course surveys the key issues related to the strategic management of technology at the firm level. Course objective is to improve the students' knowledge and skills related to managing technologies in a firm. It provides an introduction to the concepts and methods in the following topic Identification of Firm's Current and Potential Technologies; Auditing Firm's Technological Capabilities ; Technology Assessment (Technology Forecasting, Evaluation of Technology Impact on the Firm's Competitiveness) ; Technology Planning (Strategic view) ; Acquisition & Exploitation of Technology (Technological Innovation, Technology Transfer)

Lab and Tutorials
The course requires practice and problem solving training during tutorials

Literature
- Management of Technology, Khalil Tarik, 2004

(IENG) - IENG 493

Course Title	**Graduation Project I**	
Course Code	**IENG 493**	
Prerequisites	Senior Standing	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring (Semester 8)	
Contact Hours	Lectures	3
	Tutorials	
	Labs	
	TOTAL	3
EG Credit Hours	3	
ECTS	6	
Student Workload (SWL)	180	
Topic Category	Projects and Practical Training	
Topic Level	Program Requirements	

Description
Application-oriented capstone project to show competence in major academic area, where an independent research project is conducted under the guidance of a faculty member in the IENG program. The research should contribute to the advancement of knowledge in the field. Written report and formal presentation are required.

Lab and Tutorials
Not Applicable

Literature
Not Applicable

(IENG) - IENG 495

Course Title	**Graduation Project II**	
Course Code	**IENG 495**	
Prerequisites	IENG 493 - Graduation Project I	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Fall (Semester 9)	
Contact Hours	Lectures	3
	Tutorials	
	Labs	
	TOTAL	3
EG Credit Hours	3	
ECTS	6	
Student Workload (SWL)	180	
Topic Category	Projects and Practical Training	
Topic Level	Program Requirements	

Description
The continuation and completion of the capstone project I**.**

Lab and Tutorials
Not Applicable

Literature
Not Applicable

(IENG) - MENG 202		
Course Title	**Solid Modeling and Workshop**	
Course Code	**MENG 202**	
Prerequisites	ENGR 002 - Introduction to Engineering Design	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	0
	Labs	1.5
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topic Category	Basic Engineering Sciences	
Topic Level	School Requirements	

Description
The course is split in two parts; the first is focussing on using 3D CAD package to develop solid models in order to generate assemblies and 2D drawings. The second part (2/3 of the contact hours) is focussing on workshop technology manifested in different machining and forming technologies.This includes (Turning, Milling, Drilling, Grinding, Sheet Metal Works and basic formic operations).

Lab and Tutorials
Students are exposed to basic workshop practice techniques & application of the basic skills to undertake a project.

Literature

1. Course Textbook: Dugan Solid Modeling and Applications: Rapid Prototyping, CAD and CAE Theory. Springer, 2017
2. M. P. Groover , “principles of Modern Technologies”, John Wiley

Additional Resources:

- William E. Howard. Introduction to Solid Modeling Using SolidWorks 2017, McGraw-Hill Education; 13 Ed, 2017
- Donald E. Lacourse. Handbook of Solid Modeling, McGraw-Hill, 1995

(IENG) - MENG 204		
Course Title	**Mechanical Measurements**	
Course Code	**MENG 204**	
Prerequisites	PHYS 002 - Physics II	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures	3
	Tutorials	0.75
	Labs	0.75
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topic Category	Basic Engineering Sciences	
Topic Level	Program Requirements	

Description
This course focuses on basics of mechanical measurement systems including static and dynamic characteristics of instruments, static analysis of measurement errors, variable conversion elements and signal conditioning and amplification. Also, it covers metrology and mechanical measuring instruments, and introduces different types of sensors (like strain, force, pressure, flow, power, temperature)

Lab and Tutorials
Regular tutorial sessions are given to cover theory of operation of different physics and labs are conducted as well to show students metrology devices and DAQ process.

Literature
Course Textbook:

- Richard S. Figliola, Donald E. Beasley, “Theory and Design for Mechanical Measurements” 5th edition, John Wiley, 2006

(IENG) - MENG 304		
Course Title	**Thermodynamics I**	
Course Code	**MENG 304**	
Prerequisites	PHYS 002 - Physics II	CHEM 001 - Chemical Principles
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures:	1.5
	Tutorials:	1.5
	Labs:	1.5
	TOTAL	4.5
EG Credit Hours	2	
ECTS	3	
Student Workload (SWL)	75	
Topic Category	Basic Engineering Sciences	
Topic Level	Program Requirements	

Description
The course gives an introduction to the basics concepts of thermodynamics as related to the conversion of heat to mechanical work. Topics include, properties of pure substance, 1st law of thermodynamics for open and closed systems, 2nd law of thermodynamics, entropy and entropy change.

Lab and Tutorials
Teach the students the necessary skills to solve thermodynamics problems.
Demonstrate some of the fundamental concepts tough in the course like the properties of pure substance, the conversion of work and energy.

Literature
Course Textbook:

- Thermodynamics: An Engineering Approach*, 8th edition*. Yunus A. Cengel and Michael A. Boles, 2014 McGraw-Hill Education.

Additional Resources:

- Property Tables Booklet for Thermodynamics: An Engineering Approach*, 8th edition*. Yunus A. Cengel, 2014 McGraw-Hill Europe.
- Lecture Notes

(IENG) - MENG 305		
Course Title	**Fluid Mechanics I**	
Course Code	**MENG 305**	
Prerequisites	PHYS 002 - Physics II	
Classification within the curriculum	Elective	
Course Position in Study Plan	Fall	
Contact Hours	Lectures:	3
	Tutorials:	0.75
	Labs:	0.75
	TOTAL:	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topic Category	Basic Engineering Sciences	
Topic Level	Program Requirements	

Description
The aim of the course is to introduce the students to the topic of fluid mechanics. Topics include the difference between a fluid and a solid, properties of fluids, fluid statics and hydro-static forces, continuity equation and steady flow, jet forces and momentum equations, Bernoulli equation and its applications, pressure losses and pipes and fittings.

Lab and Tutorials
Teach the students the necessary skills to deal with real life problems as related to fluid mechanics.
Demonstrate some of the fundamental concepts tough in the course like the Bernoulli equation and jet forces.

Literature
Course Textbook:

- Fluid Mechanics: Fundamentals and Applications, 4th edition. Yunus A. Cengel and John M. Cimbala, 2017 McGraw-Hill Education.

Additional Resources:

- Fluid Mechanics, 8th edition. Frank White 2015 McGraw-Hill Education
- Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 8th edition, Philip M. Gerhart, Andrew L. Gerhart and John I. Hochstein 2016 Wiley
- Lecture Notes

(IENG) - MENG 323		
Course Title	**Fundamentals of Mechatronics Engineering**	
Course Code	**MENG 323**	
Prerequisites	MATH 205 - Differential Equations	
Classification within the curriculum	Elective	
Course Position in Study Plan	Spring	
Contact Hours	Lectures	3
	Tutorials	1.5
	Labs	0
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL)	125	
Topic Category	Engineering Applications	
Topic Level	Program Requirements	

Description
Electromechanical system modeling, Control and Applications. Design of Electronic Interfaces and Controllers for Mechanical Devices. Sensor Technology, Signal acquisition, Filtering, and Conditioning.
Microcontroller-based Closed-loop Control. Device Communications Sensor and actuator selection, installation, and application strategies.

Lab and Tutorials

Literature
Course Textbook: Clarence W. de Silva, Farbod Khoshnoud, Maoqing Li, Saman K. Halgamuge, “Mechatronics: Fundamentals and Applications” 2015.
Additional Resources:

- Class notes.

(IENG) - NSCI 102

Course Title	**Selected Topics in Environmental Science**	
Course Code	**NSCI 102**	
Prerequisites	None	
Classification within the curriculum	Compulsory	
Course Position in Study Plan	Spring	
Contact Hours (weekly)	Lectures	3
	Tutorials	1.5
	Labs	
	TOTAL	4.5
EG Credit Hours	3	
ECTS	5	
Student Workload (SWL) / semester	125	
Topic Category	Engineering Culture	
Topic Level	Program Requirements	

Description
A course in any of the fields of environmental sciences related to the discipline it is offered to.