

SCHOOL OF ENGINEERING

MAURICE GRANEX, *Dean*RAYMOND J. STITH, *Assistant Dean*

GENERAL STATEMENT

THE SCHOOL OF ENGINEERING has as its purpose the implementation of the general purposes of the University of Dayton in the development of professional attitudes and competencies within its area of academic disciplines.

The engineering curricula in each of the fields of Chemical, Civil, Electrical, Industrial, and Mechanical Engineering are drawn up for a four year minimum period with one summer session required in Chemical Engineering and Civil Engineering.

No effort is spared to acquaint the student thoroughly with fundamental principles and to give him a clear insight into the analysis of engineering problems. While emphasis is laid on fundamental theory, continued attention is paid to the solution of practical problems for the purpose of illustrating scientific principles and pointing out their industrial applications.

The broader responsibilities of the Engineering profession demand that the professional training of an Engineer include at least an acquaintance with the humanities in order that scientific discoveries and developments by Engineers may result in the real advancement of man. To help the young Engineer achieve his purpose in life, the University offers, in addition to the prescribed Engineering subjects, a wide selection of courses in the Arts and Sciences and Business Administration.

STANDING COMMITTEES
OF THE
SCHOOL OF ENGINEERING*Executive Committee*

PROF. ROBERT I. MITCHELL
PROF. HAROLD NIELSEN
BRO. LOUIS ROSE, S.M.

PROF. S. J. RYCKMAN
PROF. R. J. STITH

Committee on Curriculum and Standards

PROF. T. G. CSAKY

PROF. ROBERT I. MITCHELL

PROF. R. J. STITH

Committee on Facilities

PROF. J. J. CHAMBERLAIN

PROF. A. J. MORGAN

PROF. J. R. THORNE

Library Committee

PROF. GEORGE DRISCOLL
PROF. ROBERT I. MITCHELL

BRO. LOUIS ROSE, S.M.
PROF. HOWARD SMITH

PROF. R. J. STITH

Committee on Advanced Standing

PROF. GEORGE DRISCOLL

MR. REINHOLD KUBACH

PROF. HAROLD NIELSEN

ENGINEERING ORIENTATION LECTURES

ALL ENTERING FRESHMEN are required to attend a series of orientation lectures one hour a week for the first semester of enrollment. These lectures are intended to acquaint the student with the School of Engineering, academic requirements, and the various fields of engineering.

ENGINEERING MATHEMATICS

STUDENTS ADMITTED TO THE SCHOOL OF ENGINEERING are required to take certain qualifying tests for proper placement in the mathematics sequence. All should achieve a satisfactory score on the basic mathematics test. Students who fail to do this are considered unprepared for engineering mathematics. The subject matter of this examination includes: Operations with factoring, fractions, exponents, radicals and logarithms; progression, ratio, proportion and variation; functions and their graphs; linear and quadratic equations in one and two unknowns with word problems; trigonometric functions with applications to the solution of triangles; graphs of trigonometric functions.

Those students who make a sufficiently high score on the basic mathematics test will be scheduled to take a proficiency examination in college algebra and college trigonometry. This will cover the following subject matter: Inequalities, binomial theorem, logarithmic and exponential equations, approximate solutions of polynomial equations, determinants, permutations, combinations, and probability; partial fractions, trigonometric equations and identities, complex numbers and DeMoivre's Theorem, and properties of trigonometric functions.

All students who make sufficiently high scores on the proficiency test will be placed in MTH 216, Analytical Geometry and Calculus I. Those who do not will be placed in MTH 117, will be behind schedule, and will require additional time to complete the requirements for graduation.

DEGREE REQUIREMENTS

THE DEGREES—Bachelor of Chemical, Civil, Electrical, Industrial, and Mechanical Engineering—are conferred at commencement if the following requirements have been fulfilled:

- 1) All prescribed courses outlined in the respective curricula must have been passed with a grade D or better;
- 2) The cumulative quality point average must be at least 2.0;
- 3) The student must have attended the School of Engineering at the University of Dayton during his senior year, and have carried at least thirty credit hours;
- 4) The student must not be obligated to the University financially.

Curriculum For All Engineering Freshmen

FIRST SEMESTER		SECOND SEMESTER	
<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
CHM 123 General Chemistry	3	CHM 124 General Chemistry	3
CHM 123L General Chemistry Lab. ...	1	CHM 124L General Chemistry Lab. ...	1
ENG 101 English Composition I	3	ENG 102 English Composition II ...	3
MTH 216 Anal. Geom. & Calc. I	5	MTH 217 Anal. Geom. & Calc. II ...	4
MIL 101 First Year Basic	2	MIL 102 First Year Basic	2
ORI 100 Engr. Orientation	0	PHE 101 Physical Education	1½
PHE 103 Health	1	PHY 206 General Physics	3
*THL 106 Dogmatic Theology		PHY 206L General Physics Lab.	1
or		*SPE 101 Fund. of Eff. Speak.	3
PHL 103 Logic	3		
	18		20½

*The first semester theology or philosophy course and the second semester speech course are assigned in either semester at the discretion of the School of Engineering.

CHEMICAL ENGINEERING

THE CURRICULUM IN Chemical Engineering is directed toward the training of students for technical and executive positions in the chemical and allied industries.

Chemistry is studied coordinately with mathematics, physics, and mechanics; these studies constitute a basis for the later topics which are devoted more specifically to problems of chemical engineering processes, equipment, control, and design. Study of the flow of fluids, heat transfer, thermodynamics, unit operations, plant design and industrial control is also included.

This curriculum serves as basic training for industries concerned with chemical processes, biologicals, petroleum, and nuclear energy.

Sophomore Year

FIRST SEMESTER		SECOND SEMESTER	
<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
CHM 215 Quantitative Anal. I	2	CHM 303 Physical Chemistry	3
CHM 217L Quan. Anal. I Lab.	1	CHM 303L Physical Chemistry Lab. ...	1
CME 202 Chem. Engr. Fund. I	3	MTH 301 Differential Equations	3
MTH 218 Anal. Geom. & Calc. III ...	4	MEE 206L Engr. Graphics I	2
MIL 201 Second Year Basic	2	MIL 202 Second Year Basic	2
PHY 207 General Physics	3	PHY 208 General Physics	3
PHY 207L General Physics Lab.	1	PHY 208L General Physics Lab.	1
THL 206 Gen. Moral Theol.		Humanistic-Social Studies	3
or			
PHL 207 Phil. Psychology	3		18
	19		

Summer After Sophomore Year

<i>Subjects</i>	<i>Cr. Hours</i>
ECO 203 Survey of Economics	3
Humanistic-Social Studies	3
	6

Junior Year

FIRST SEMESTER		SECOND SEMESTER	
<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
CHM 304 Physical Chemistry	3	CHM 314L Organic Chemistry Lab. ...	1
CHM 304L Physical Chemistry Lab. ...	1	CHM 316 Organic Chemistry	3
CHM 313L Organic Chemistry Lab. ...	1	CME 304 Chem. Engr. Fund. III	3
CHM 315 Organic Chemistry	3	CME 312 Unit Operations II	3
CME 303 Chem. Engr. Fund. II	3	CME 420 Seminar	1/2
CME 311 Unit Operations I	3	CME 481 Engr. Calculations	3
CME 420 Seminar	1/2	PHY 321 Nuclear Physics	3
EGM 202 Statics	3	THL 306 Theol. & Moral Virtues	
	17 1/2	or	
		PHL 402 Gen. Metaphysics	3
			19 1/2

Senior Year

FIRST SEMESTER		SECOND SEMESTER	
<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
CME 411 Unit Operations III	3	CME 414L Unit Operations Lab.	2
CME 413L Unit Operations Lab.	2	CME 420 Seminar	1/2
CME 420 Seminar	1/2	CME 430 CME Design	3
CME 426L Chem. Engr. Proj.	2	CME 452L Indus. Instrum. Lab.	2
(or CME 502 or 504)		ELE 302 Elec. Engineering	2
CME 451 Indus. Instrum.	2	ELE 302L Elec. Engr. Lab.	1
ELE 301 Elec. Engineering	2	EGM 303 Strength of Materials	3
ELE 301L Elec. Engr. Lab.	1	EGM 305L Materials Testing	1
Humanistic-Social Studies	3	Humanistic-Social Studies	3
THL 406 Christology & the Sac.		Technical Elective	3
or			20 1/2
PHL 404 Ethics	3		
	18 1/2		

Chemical Engineering Electives

CME 400 Elementary Chem. Engineering Research
CME 461 Elements of Nuclear Engineering
CME 471 Elements of Bio-Engineering
CME 499 Special Problems in Chemical Engineering
CME 501 Advanced Thermodynamics
CME 502 Fluid Flow
CME 503 Advanced Unit Operations
CME 504 Heat Transmission

CIVIL ENGINEERING

THE CURRICULUM is designed to give a thorough education in the principles fundamental to the civil engineering profession, so that the graduate is prepared to pursue to advantage any field of civil engineering practice or advanced study.

During the first two years, emphasis is placed on those subjects underlying all engineering—English, mathematics, chemistry, physics, drawing, surveying, mechanics. The third and fourth years are devoted principally to technical subjects relative to hydraulic, sanitary, structural, highway, and soils engineering.

Engineering projects, completed or under construction, are visited under the guidance of the instructors. The Student Chapter of the American Society of Civil Engineers is very active, and close association is maintained with the Dayton Section of the American Society of Civil Engineers.

Sophomore Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
CIE	207 Surveying I	4	CIE	208 Surveying II	3
MTH	218 Anal. Geom. & Calc. III	4	EGM	202 Statics	3
MEE	206L Engr. Graphics I	2	GEO	218 Engr. Geology	3
MIL	201 Second Year Basic	2	MTH	301 Diff. Equations	3
PHY	207 General Physics	3	MEE	207L Engr. Graphics II	2
PHY	207L Gen. Physics Lab.	1	MIL	202 Second Year Basic	2
THL	206 Gen. Moral Theol.		PHY	208 General Physics	3
	or		PHY	208L Gen. Physics Lab.	1
PHL	207 Phil. Psychology	3			20
		19			

Summer After Sophomore Year

<i>Subjects</i>	<i>Cr. Hours</i>
CIE	205L Surveying Field Practice 3

Junior Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
CIE	307 Hydraulics	4	CIE	306 Theory of Structures	5
CIE	307L Hydraulics Lab.	1	CIE	310L Civil Engr. Lab.	1
EGM	301 Dynamics	3	EGM	304 Adv. Str. of Mat.	3
EGM	303 Strength of Materials	3	ELE	302 Electrical Engr.	2
ELE	301 Electrical Engr.	2	ELE	302L Elec. Engr. Lab.	1
ELE	301L Elec. Engr. Lab.	1		Humanistic-Social Studies	3
MEE	301 Thermodynamics	3		Technical Elective	3
THL	306 Theol. & Moral Virtues				18
	or				
PHL	402 General Metaphysics	3			
		20			

Senior Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
CIE	405 Highway Engineering	3	CIE	402 Structural Design II	2
CIE	407 Reinforced Concrete	4	CIE	402L Structural Design Lab. II ..	2
CIE	409 Soil Mechanics	2	CIE	406 Indeterm. Structures	3
CIE	409L Soil Mechanics Lab.	1	CIE	408 Seminar	1
CIE	415 Structural Design I	3	CIE	434 Sanitary Engr. II	3
CIE	433 Sanitary Engr. I	3		Humanistic-Social Studies	6
THL	406 Christology & the Sac.			Technical Elective	3
	or				20
PHL	404 Ethics	3			
		19			

Civil Engineering Electives

CIE 421	Construction Engineering
CIE 422	Materials of Construction
CIE 499	Special Problems in Civil Engineering
CIE 502	Prestressed Concrete
CIE 504	Limit Design in Steel
CIE 506	Ultimate Design in Reinforced Concrete
CIE 524	Foundation Design
CIE 542	Highway Design I
CIE 544	Traffic Engineering

ELECTRICAL ENGINEERING

THE CURRICULUM of Electrical Engineering is planned with the primary objective of providing a thorough knowledge of the fundamental laws of electricity and the application of these laws in Electrical Engineering.

Courses are arranged to give students of Electrical Engineering an understanding of the basic principles and practices in the fields of Electrical Power and Electrical Communications. Some degree of specialization in these fields is provided according to the abilities and interests of the individual students.

Proper attention is directed to an appreciation of the practical economic factors in the electrical world, and to the cultural and social qualities necessary for a successful career in the Engineering Profession.

Sophomore Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
ELE 201	Ele. of Elec. Engr.	3	EGM 202	Statics	3
MTH 218	Anal. Geom. & Calc. III	4	ELE 205	A. C. Circuits	3
MEE 206L	Engr. Graphics I	2	MTH 341	Adv. Engr. Mth. I	3
MIL 201	Second Year Basic	2	MIL 202	Second Year Basic	2
PHY 207	General Physics	3		Humanistic-Social Studies	3
PHY 207L	General Physics Lab.	1	PHY 208	General Physics	3
THL 206	Gen. Moral Theol.		PHY 208L	General Physics Lab.	1
	or				18
PHL 207	Phil. Psychology	3			
		18			

Junior Year

FIRST SEMESTER		SECOND SEMESTER	
<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
EGM 301 Dynamics	3	ELE 310 Circuit Analysis	3
EGM 303 Strength of Materials	3	ELE 310L Circuit Analysis Lab.	1
ELE 307 Elec. Measurements	3	ELE 313 Engr. Elec. II	3
ELE 307LElec. Meas. Lab.	1	ELE 313LEngr. Elec. Lab. II	1
ELE 312 Engr. Elec. I	3	ELE 318 Machinery I	3
ELE 312LEngr. Elec. Lab. I	1	Technical Elective	3
MTH 342 Adv. Engr. Mth. II.....	3	Humanistic-Social Studies	3
THL 306 Theol. & Moral Virtues			17
or			
PHL 402 General Metaphysics	3		
	20		

Senior Year

FIRST SEMESTER		SECOND SEMESTER	
<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
ELE 403 Machinery II	3	ELE 410 Seminar	1
ELE 403LMachinery Lab.	1	ELE 414 Adv. Electronics	3
ELE 408 Elec. Transients	3	INE 313 Engineering Law	2
ELE 413 Comm. Engineer	3	MEE 301 Thermodynamics	3
ELE 413LComm. Engr. Lab.	1	Humanistic-Social Studies	3
THL 406 Christology & the Sac.		Technical Electives	6
or			18
PHL 404 Ethics	3		
Technical Elective	3		
	17		

Electrical Engineering Electives

ELE 411 Electric and Magnetic Field Theory
ELE 412 Power Distribution
ELE 415 Microwave Theory and Practice
ELE 417 Thesis
ELE 419 Servomechanisms
ELE 422 Transistor Circuits
ELE 499 Special Problems in Electrical Engineering
ELE 502 Advanced Circuit Analysis
ELE 503 Analog Computers
ELE 504 Digital Computers
ELE 511 Advanced Theory—Rotating Machinery I
ELE 512 Advanced Theory—Rotating Machinery II
MTH 343 Advanced Engineering Mathematics III
PHY 408 Electricity and Magnetism

INDUSTRIAL ENGINEERING

THE INDUSTRIAL ENGINEERING profession applies creative ability in a scientific manner to the design, installation, or improvement of complex integrated

systems involving physical resources such as machinery, equipment, materials, and money; so that people may be more effective in reaching their objectives.

The profession is unique in that it emphasizes the *combination and integration* of knowledge from many disciplines in such a manner that the total objective may be achieved effectively by the people responsible for the achievement. It strives to utilize *scientific methods* to arrive at the proper relationships. The complex relationships of men, materials, machinery, and money found in almost every activity in modern society demand special knowledge and skill in *design of systems* as such. The industrial engineer is, therefore, required to call upon many other specialists for detailed knowledge of various specialized components of the systems. These may involve many other branches of engineering, other scientific and non-scientific disciplines, so that the total combination of all results in maximum achievement. In emphasizing accomplishment, industrial engineering represents the engineering approach to management (the responsibility for achieving objectives through people).

Industrial engineering activities have expanded far beyond the complex systems of manufacturing "industry," which gave the profession its name. The principles and practices are useful to all areas of human industry—where employment is purposeful and systematic, and where men give attention to achievement and are diligent in their attempts to accomplish objectives. Thus, the surgeon has benefited from systematic study of motions to lessen the time spent on an operating table, and the housewife has benefited from step-saving arrangements resulting from industrial engineering research. However, the bulk of the work in the field is still performed in "industry" where land, capital, and labor meet and must be economically and efficiently related.

In accord with the objectives of the University, the industrial engineering curriculum reflects the understanding that the tasks which people perform are subordinate to the people themselves.

Therefore, the industrial engineering curriculum is designed to help the student develop sound religious and moral convictions, broad knowledge and basic intellectual habits, physical vigor and emotional stability, a keen awareness of social responsibility along with his specialized professional attitudes and competencies.

Sophomore Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
ECO	203 Survey of Economics	3	EGM	202 Statics	3
MTH	218 Anal. Geom. & Calc. III ..	4	INE	408 Admin. & Organization ..	3
MEE	206LEngr. Graphics I	2	MEE	207LEngr. Graphics II	2
MIL	201 Second Year Basic	2	MEE	211 Materials & Processes	2
PHY	207 General Physics	3	MEE	211LMate. & Processes Lab. ..	1
PHY	207LGeneral Physics Lab.	1	MIL	202 Second Year Basic	2
PSY	204 General Psychology	3	PHY	208 General Physics	3
		18	PHY	208LGeneral Physics Lab.	1
			THL	206 Gen. Moral Theol.	
			or		
			PHL	207 Phil. Psychology	3
					20

Junior Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
ACC 203	Survey of Accounting	3	ACC 310	Cost Analysis	3
EGM 301	Dynamics	3	INE 301	Personnel Admin.	3
EGM 303	Strength of Materials	3	MTH 332	Appl. of Statistics	3
INE 401	Engineering Economy	2	MEE 301	Thermodynamics	3
MTH 331	Statistics for Engrs.	3	MEE 303	Metallurgy	2
MEE 202	Mechanisms	1	MEE 303L	Metallurgy Lab.	1
MEE 202L	Mechanisms Lab.	1	THL 306	Theol. & Moral Virtues	
PSY 420	Industrial Psychology	3		or	
		19	PHL 402	General Metaphysics	3
					18

Senior Year

FIRST SEMESTER			SECOND SEMESTER		
<i>Subjects</i>		<i>Cr. Hours</i>	<i>Subjects</i>		<i>Cr. Hours</i>
ELE 301	Electrical Engr.	2	ELE 302	Electrical Engr.	2
ELE 301L	Elec. Engr. Lab.	1	ELE 302L	Elec. Engr. Lab.	1
INE 303	Wage Administration	3	INE 313	Engineering Law	2
INE 403	Time & Motion Study I	2	INE 404	Time & Motion Study II	2
INE 403L	Time & Mot. Study Lab. I	1	INE 404LT	& M Study Lab. II	1
INE 405	Production Planning	3	INE 406	Plant Lay., Matl.: Hand. 2	
INE 421	Reliability Theory	3	INE 406L	Pl. Lay. & Matl.	
SOC 315	Industrial Sociology	3		Hand. Laboratory	1
		18	INE 410	Seminar	1
			THL 406	Christology & the Sac.	
				or	
			PHL 404	Ethics	3
			Technical Elective		3
					18

Industrial Engineering Electives

INE 201	Industrial Engineering Fundamentals
INE 332	Statistical Control and Systems Design
INE 422	Reliability Application
INE 499	Special Problems in Industrial Engineering

MECHANICAL ENGINEERING

THE CURRICULUM of Mechanical Engineering is designed to give the student knowledge of the fundamental principles of science and the application of these principles to pertinent problems.

Basic studies in mathematics and the sciences are pursued in the first two years and departmental subjects are taken up in the last two years. The course of studies comprises lectures, recitations and discussions, laboratory practice, and inspection visits.

Every attempt is made to impress the student with the responsibilities that rest upon the Mechanical Engineer in the active field, whether engaged as designer, builder, operator, organizer, manager or executive.

FIRST SEMESTER *Sophomore Year* SECOND SEMESTER

<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
EGM 202 Statics	3	MTH 341 Adv. Engr. Mth. I	3
Humanistic-Social Studies	3	MEE 202 Mechanisms	1
MTH 218 Anal. Geom. & Calc. III	4	MEE 202L Mechanisms Lab.	1
MEE 206LEngr. Graphics I	2	MEE 207LEngr. Graphics II	2
MIL 201 Second Year Basic	2	MEE 211 Materials & Processes ..	2
PHY 207 General Physics	3	MEE 211LMate. & Processes Lab. ..	1
PHY 207LGeneral Physics Lab.	1	MIL 202 Second Year Basic	2
	18	PHY 208 General Physics	3
		PHY 208LGeneral Physics Lab.	1
		THL 206 General Moral Theol.	
		or	
		PHL 207 Phil. Psychology	3
			19

FIRST SEMESTER *Junior Year* SECOND SEMESTER

<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
EGM 301 Dynamics	3	EGM 304 Adv. Strength of Mat.	3
EGM 303 Strength of Materials	3	ELE 205 A. C. Circuits	3
EGM 305L Materials Testing Lab.	1	MEE 302 Thermodynamics II	3
ELE 201 Elem. of Elec. Engr.	3	MEE 303 Metallurgy	2
MEE 301 Thermodynamics I	3	MEE 303LMetallurgy Lab.	1
MEE 308 Fluid Mechanics	3	MEE 305LMech. Engr. Lab. I	1
MEE 414 Seminar	0	MEE 307 Dynamics of Machinery ..	2
THL 306 Theol. & Moral Virtues		MEE 307LDynamics of Mach. Lab. 1	1
or		MEE 310 Thermal Engineering I	3
PHL 402 General Metaphysics	3	MEE 414 Seminar	0
	19		19

FIRST SEMESTER *Senior Year* SECOND SEMESTER

<i>Subjects</i>	<i>Cr. Hours</i>	<i>Subjects</i>	<i>Cr. Hours</i>
MEE 407 Machine Design I	2	Humanistic-Social Studies	6
MEE 407LMachine Design I Lab.	1	MEE 406LMech. Engr. Lab. II	2
MEE 410 Heat Transfer	3	MEE 408 Machine Design II	2
MEE 412LFuels & Lub. Anal. Lab. 1	1	MEE 408LMachine Design II Lab. ..	1
MEE 414 Seminar	0	MEE 414 Seminar	1
MEE 418 Adv. Fluid Mechanics	3	MEE 417 Thermal Engineering II ...	3
MEE 419 Mech. Engr. Analysis	2	MEE 423 Heat., Air Cond., Refrig. 3	
Technical Elective	3		18
THL 406 Christology & the Sac.			
or			
PHL 404 Ethics	3		
	18		

Mechanical Engineering Electives

MEE 416 Mechanical Vibrations
MEE 416L Mechanical Vibrations Laboratory
MEE 421 Turbo-Machinery
MEE 431 Advanced Dynamics of Machinery
MEE 499 Special Problems in Mechanical Engineering
MTH 342 Advanced Engineering Mathematics II
PHY 311 Atomic Physics
PHY 321 Nuclear Physics