

Whiting School of Engineering

Bachelor of Arts in General Engineering

For students entering in Fall 2019 or later

June 2019

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1 INTRODUCTION

Our time has already seen the rapid development of a broad range of technological, scientific and engineering innovations which shape the way in which contemporary society functions. The pace of these developments will become even faster and more global in this century. The Bachelor of Arts in General Engineering is designed to provide students with the fundamental engineering principles needed to understand the basics of, and to work with, modern technology, innovations and engineering practices.

The B.A. degree with a major in General Engineering is intended for undergraduate students who desire a background in engineering and technology yet have neither the desire nor the intention to become professional engineers. These students may, for example, plan to pursue graduate or professional study in architecture, business, law (e.g. intellectual property, patent law) or medicine. They may wish to work in areas which relate to engineering and technology such as public policy or to thrive in the global industrial economy. The Bachelor of Arts in General Engineering is a true liberal arts degree with a concentration in engineering.

The distinctive features of the Bachelor of Arts in General Engineering include:

Breadth. Course requirements for the Bachelor of Arts in General Engineering encourage breadth. Approximately 17% of required credits are in mathematics or statistics, 12% in the natural sciences, 20% in humanities and/or social sciences, 8% in international studies (language or other) and 30% in engineering, with the rest being free electives.

Flexibility. This program is designed to allow students, in consultation with their advisor, the flexibility to choose a program of study which develops their interests. The engineering concentration and the humanities and social science requirements may be departmentally based or may follow a creative theme designed by the student and his/her advisor. Students are encouraged to minor in any area of their choosing.

Interdisciplinary Study. The distribution requirements are ideal for students who seek to understand areas at the interface between technical fields (such as robotics, nanotechnology and biomaterials) or the connections between a technical area and a discipline in the humanities or social sciences (for example environment issues and international trade or ethics and biotechnology).

International Dimensions of Engineering. Students are required to develop some knowledge of the international dimensions of engineering. They can do this by studying abroad or by taking a combination of language and other classes which develop an understanding of the culture, technology or society in a foreign country.

This degree is not an engineering degree, and is not suitable for employment as a professional engineer. This program is **not** accredited by the Accreditation Board for Engineering and Technology. Students desiring careers as professional engineers should complete a B.S. degree in one of the engineering disciplines offered by the Whiting School.

2 FACULTY

The faculty committee which oversees the BA in General Engineering consists of:

Michael Falk, Vice Dean for Undergraduate Education and Professor of Materials Science & Engineering, Mechanical Engineering and Physics (ex officio chair)

Lise Dahuron, Senior Lecturer, Chemical and Biomolecular Engineering

Steven Marra, Associate Professor of Mechanical Engineering

Kalina Hristova, Associate Professor of Materials Science and Engineering

Dan Naiman, Professor of Applied Mathematics and Statistics

Rachel Sangree, Lecturer, Civil Engineering

Erica Schoenberger, Professor of Geography and Environmental Engineering

Scott Smith, Professor of Computer Science

Howard Weinert, Professor, Electrical and Computer Engineering

For information about and advising for the Bachelor of Arts in General Engineering please contact Professor Michael Falk, Vice Dean for Education, Whiting School of Engineering, Johns Hopkins University, 3400 N. Charles Street, Baltimore, MD 21218-2681, Tel. (410) 516-7395 or e-mail at mfalk@jhu.edu.

3 GENERAL REGULATIONS

All undergraduate students majoring in the Bachelor of Arts in General Engineering must follow a program approved by their advisor. Your advisor can be any member of the faculty committee who oversee the BA in General Engineering (see above), or any faculty member approved by them.

Candidates for the Bachelor of Arts in with major in General Engineering must fulfill the overall requirements for the Bachelor of Arts degrees as described in the University Catalog. These include the University writing requirement, distribution requirement and 120-credit minimum. Details of these requirements are also provided in the Undergraduate Academic Manual.

Briefly, the requirements are as follows:

- *Mathematics*: five courses; two in calculus, one in statistics, one 200-level or above and one elective (minimum of 20 credits).
- *Natural Sciences*: four courses (of which at least one must be physics) and two terms of laboratory (minimum of 15 credits).
- *Humanities and/or Social Sciences*: one course in English writing or composition, at least **four** related courses which form a core (two of which are at the advanced level) and three additional courses coded H or S (minimum of 24 credits).
- *International Dimensions of Engineering*: Either a semester abroad or three courses which provide expertise in international issues (these may count towards the Humanities or Social Science requirement above).
- *Engineering*: one course which is an introduction to an engineering discipline, one course in a computer language, three fundamental engineering science courses, and six courses in an engineering concentration which are related thematically or departmentally (at least three of which must be at the advanced level) (minimum of 35 credits).

- *Free Electives*: a minimum of five full courses (at least 3 credits each). The number of credits required to reach the minimum of 120 will depend on how the International Dimensions requirement is satisfied and on the courses chosen in other areas.

Students are required to have a minimum cumulative GPA of 2.0 to graduate. Further, a maximum of 12 D credits may be counted towards degree requirements and no more than 12 credits completed prior to matriculation or in summer sessions at other accredited colleges or universities may be accepted.

Transfer students are not subject to 12 credits of transfer credit restriction; they must obtain credit for courses they wish to transfer during their first year at Hopkins. University regulations require a minimum of four consecutive full-time semesters and 60 credits earned at JHU for a Hopkins degree.

4 MATHEMATICS REQUIREMENTS

Mathematics and statistics are at the very core of modern science and technology and a solid foundation is required to understand how contemporary engineering problems are solved. Students are required to take five courses (a minimum of 20 credits) including:

110.108 Calculus I.

110.109 Calculus II.

One course in statistics.

One course at the 200-level or above in either mathematics or statistics.

One mathematics or statistics elective.

Students are strongly advised to take a calculus-based statistics course.

5 NATURAL SCIENCE REQUIREMENTS

The natural sciences, particularly physics and chemistry, form the foundation for most engineering disciplines. In more recent times, biology has become an increasingly important component of modern technology. Students must therefore be familiar with these areas and be trained in fundamental laboratory techniques. Students are required to take four courses and two laboratory courses (a minimum of 15 credits) including:

171.101 or 108 General Physics I and at least one course chosen from

030.101 Introductory Chemistry or

020.151 General Biology,

two terms of laboratory course; and

two elective courses (area code N).

6 HUMANITIES AND SOCIAL SCIENCE REQUIREMENTS

The Humanities and Social Sciences play a particularly important role in the education of an individual in the Bachelor of Arts in General Engineering. Students are strongly encouraged to include at least one course in economics and one in the history of science and technology.

6.1 AREA OF CONCENTRATION

The Humanities and Social Science portion of the program is of great importance in broadening the student's education and in stimulating the development of a critical and inquisitive mind as well as incisive analytical skills. In order to best attain these objectives, Humanities and Social

Science courses must be chosen as a coherent group in one area of concentration. A minimum of four courses (12 credits) must be taken, of which two are at the advanced (300+) level.

Examples of areas are listed below.

- Africana Studies
- Anthropology
- Asian Studies
- Economics
- Geography
- History and Philosophy of Science
- Ancient, Classical, Medieval and Renaissance studies
- International Relations
- Latin American Studies
- Moral and Political Philosophy
- Political Institutions
- Psychology
- Sociology
- Eighteenth, Nineteenth, and Twentieth Century studies

6.2 H/S ELECTIVE

Students must add three additional full courses (minimum 9 credits) in either the humanities or social sciences. These electives are typically used to take courses in economics and the history of science and technology, depending on the courses chosen to fulfill the concentration requirements detailed above.

7 WRITING REQUIREMENT

Students must complete at least four (minimum of 12 credits) writing intensive courses (catalog code W). Since competence in written communication is essential for the B.A. in General Engineering graduate, at least one of these courses must specifically develop writing skills. Although this course must be designated as a writing intensive course, this designation is not sufficient to guarantee the desirable level of intensity in writing instruction. Three courses that satisfy this requirement are:

- 661.110 Professional Writing and Communication
- 060.113-114 Expository Writing
- 220.105 Introduction to Fiction and Poetry

8 INTERNATIONAL DIMENSIONS OF ENGINEERING REQUIREMENTS

Because of the importance of the globalization of technology, all students completing the B.A. in General Engineering are required to demonstrate competence in being able to address technical issues within the context of another society. This can be done in three different ways.

1. Students are encouraged to study abroad for a minimum of one fall or one spring semester in any foreign country (except Canada). In that country, they must take the equivalent of a minimum of 12 credits which are transferred to their Hopkins transcript. In this case, these credits can satisfy any degree requirements (Humanities or Social Sciences, Engineering Concentration, Mathematics, Free Electives, etc.). Additional Free Electives must be taken to ensure that the student graduates with a minimum of 120 credits.
 2. Students can complete the equivalent of two semesters of the same foreign language (students may not use language courses in their native language to satisfy this requirement) and one additional course which relates to the culture, economy, social structure or politics of a country which uses this foreign language (minimum of 9 credits).
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3. Students can demonstrate proficiency in a foreign language by taking an intermediate course in a foreign language (this can include their native tongue) and two additional courses which relate to the culture, economy, social structure or politics of a country which uses this foreign language (see the list below for examples; minimum of 9 credits).

Africa and the Middle East

070.129 Introduction to Anthropology of the Middle East
070.222 Africa in the 21st Century
070.230 From Jihad to Revolution: Political Struggles of Women in the Middle East
070.233 Africa as a Laboratory
070.241 African Cities
070.294 Political Anthropology of Africa
100.122 or 123 Introduction to the History of Africa
100.234 The Making of the Muslim Middle East
100.282 Race & Power in Modern South Africa
100.382 Early Modern African Atlantic
100.387 Everyday Life in Medieval Middle East
100.399 Decolonization and Citizenship in Africa
100.403 Law and Custom in Colonial Africa
100.445 African Fiction as History
190.311 Disposable People: Race, Immigration, and Biopolitics
190.394 Comparative Politics of Middle East and North Africa

Asia

070.290 Modern South Asia: Bangladesh/Pakistan
070.359 Korean War
070.445 Health, Disease, Poverty: New Ethnographies from India
100.219 The Chinese Cultural Revolution
100.243 China: Neolithic to Song
100.248 Japan in the World
100.398 Images of Postwar Japan
100.424 Women & Modern Chinese History
140.346 History of Chinese Medicine

Europe

070.211 The Production of European Culture
100.103 or 104 Early Modern Europe & the Wider World
100.233 History of Modern Germany
190.440 or 441 Comparative European Politics

Latin and South America

070.249 Latin American Cities: Public Spaces & Private Lives
100.115 Modern Latin America
100.117 History of Brazil
100.246 Colonial Latin American History
100.307 Latin American Independence

All Regions (no more than one can count toward International Dimensions)

- 190.111 Introduction to Global Studies
- 190.209 Contemporary International Politics
- 190.217 Introduction to International Relations Theory
- 190.220 Global Security Politics
- 190.226 Global Governance
- 190.352 The Politics of Global Development

9 ENGINEERING REQUIREMENTS

The program requires a core of fundamental courses in the engineering sciences as well as a coherent group of related courses planned in consultation with the student's faculty advisor.

9.1 CORE REQUIREMENTS (15 CREDITS REQUIRED)

Introduction to Engineering (one course)

- 500.101 What is Engineering?
- 510.106 Foundations of Materials Science & Engineering
- 520.137 Introduction to Electrical and Computer Engineering
- 530.107 Mechanical Engineering Undergraduate Seminar I with
 - 530.108 Mechanical Engineering Undergraduate Seminar I and
 - 530.111 Introduction to Mechanical Engineering Design and CAD
- 540.101 Chemical Engineering Today
- 560.141 Perspectives on the Evolution of Structures
- 570.108 Introduction to Environmental Engineering

Computer Language (one course)

- EN.500.112 or 113 or 114 Gateway Computing

Fundamentals of Engineering Science (three courses)

(Student must choose no more than one course from the following four groups.)

1. 520.230, Mastering Electronics,
2. 560.201 Statics and Mechanics of Materials
3. either
 - 510.311 Structure of Materials, OR
 - 530.352 Materials Selection
4. either
 - 510.312 Materials Thermodynamics, OR
 - 530.231 Mechanical Engineering Thermodynamics, OR
 - 540.203 Engineering Thermodynamics.

9.2 ENGINEERING CONCENTRATION REQUIREMENTS

The concentration in engineering must consist of at least six courses (minimum of 20 credits) which are related thematically or departmentally to an engineering discipline; at least three (3) of which must be at the advanced level (300 or above). While the selection of courses must be approved by the faculty advisor, students can be guided by the “E” area designator on courses in their selection of appropriate courses. While examples of concentrations are provided below, students are encouraged to develop their own concentrations in consultation with their faculty advisor.

Sample Concentrations**Biotechnology**

520.214 Signals and Systems
510.316 Biomaterials I
510.407 Biomaterials II
580.441 Cellular Engineering
580.442 Tissue Engineering

Imaging

520.214 Signals and Systems
520.432 Medical Imaging Systems
601.226 Data Structures
601.457 Computer Graphics
601.461 Computer Vision

Computer Technology

520.142 Digital System Fundamentals
520.214 Signals and Systems
520.349 Microprocessor Lab.
520.372 Programmable Device Lab.
601.229 Computer System Fundamentals
601.414 Computer Networks

Nanotechnology

510.201 Intro. to Materials Science for Engineers
510.311 Structure of Materials
540.440 Chem. Eng. for Micro and Nanotech.
540.438 Advanced Topics in Pharmacokinetics and Pharmacodynamics

Electro-Mechanical Devices

520.142 Digital System Fundamentals
520.214 Signals and Systems

520.345 ECE Lab.

520.372 Programmable Device Lab.
530.420 Robot Actuators and Sensors
530.421 Mechatronics
601.226 Data Structures

Engineering Science

520.214 Signals and Systems
560.202 Dynamics
530.327 Intro. to Fluid Mechanics
510.201 Intro. to Materials Science for Engineers
530.405 Mechanics of Advanced Engineering Structures
520.219 Introduction to Electromagnetics

Structural Mechanics

560.202 Dynamics
560.206 Solid Mech. and Theory of Structures
510.201 Intro. to Materials Science for Engineers
560.320 Structure of Design
560.348 Probability and Statistics in CE
560.445 Advanced Structural Analysis

Environmental Engineering

570.239 Current and Emerging Env. Issues
570.301 Env. Engineering I: Fundamentals
570.353 Hydrology
530.328 Fluid Mechanics II
570.420 Air Pollution

10 FREE ELECTIVES

The Bachelor of Arts with a major in engineering requires students to take between five and nine courses in any area such that the total number of credits earned is at least 120. Typically, students who have studied abroad will have more free electives than those who have met the International Dimensions requirement through coursework.

Students must select these courses in consultation with their advisor. These free electives are designed to allow students to develop a curriculum of study uniquely suited to their interests.

11 MINORS

All undergraduate students majoring in the Bachelor of Arts in General Engineering are encouraged to minor in an area offered by any department in the School of Engineering or the School of Arts and Sciences. Students wishing to pursue a minor should confer with the department through which the minor is offered to ascertain the exact requirements.

12 Bachelor of Arts in General Engineering Checkout Sheet**Student:** _____**Class of:** _____

		Cred	Grde	Sem			Cred	Grde	Sem
Natural Sciences (min 15 credits)					Engineering Core (min 15)				
171.101	Physics I	4				Intro Engineering	3		
	NS1(Intro Chem or Bio)	3				Computing	3		
	NS2	3				EC1	3		
	NS3	3				EC2	3		
	Lab	1				EC3	3		
	Lab	1							
Mathematics (min 20)					Engineering Concentration (min 20)				
110.108	Calculus I	4				Eng1	4		
110.109	Calculus II	4				Eng2	4		
____.2__	Math/Stat 1	4				Eng3	3		
	Stat	4			____.3__	Eng4	3		
	Math/Stat 2	4			____.3__	Eng5	3		
		20			____.3__	Eng6	3		
Humanities or Social Sciences (min 24)									
	Writing*	3							
	HSC1	3			Free Electives				
	HSC2	3				FE1	3		
____.3__	HSC3	3				FE2	3		
____.3__	HSC4	3				FE3	3		
	HSE1	3				FE4	3		
	HSE2	3				FE5	3		
	HSE3	3				FE6	3		
						FE7			
						FE8			
						FE9			
International Dimensions (Study Abroad or min 9)					D credits (max 12)				
	ID1	3				Transfer Credits			
	ID2	3				Total Credits			
	ID3	3							

***Writing-Intensive Requirement:**

Students must complete 4 writing-intensive courses, minimum of 3 credits each. One course must specifically develop writing skills (see Section 7). The writing-intensive courses may be applied to any of the requirement areas above. When completing the checkout sheet, label the writing-intensive courses with a "W."