

COLLEGE OF ENGINEERING
DEPARTMENT OF AEROSPACE AND OCEAN ENGINEERING
BACHELOR OF SCIENCE IN AEROSPACE AND OCEAN ENGINEERING, MAJOR: OCEAN ENGINEERING
FOR STUDENTS GRADUATING IN CALENDAR YEAR 2017
133 CREDITS REQUIRED FOR GRADUATION

FRESHMAN FALL SEMESTER 2013		Credits	FRESHMAN SPRING SEMESTER 2014		Credits
CHEM 1035 General Chemistry (C-) <i>Pre: None</i>	3		ENGL 1106 First-Year Writing	3	
CHEM 1045 General Chemistry Lab <i>Co: CHEM 1035</i>	1		<i>Pre: ENGL 1105</i>		
ENGL 1105 First-Year Writing <i>Pre: None</i>	3		MATH 1206 Calculus <i>Pre: MATH 1205</i>	3	
MATH 1114 Elementary Linear Algebra	2		MATH 1224 Vector Geometry	2	
MATH 1205 Calculus <i>Pre: Math Ready</i>	3		<i>Pre: MATH 1205 or MATH 1225. Co: MATH 1206</i>		
ENGE 1024 Engineering Exploration (C-) <i>Co: MATH 1205</i>	2		PHYS 2305 Found of Physics I w/lab (C-)	4	
CLE (Area 2, 3, or 7)	3		<i>Pre: MATH 1205; Co: MATH 1206</i>		
TOTAL	17		ENGE 1114 Exploration Engineering Design (C-)	2	
			<i>Pre: ENGE 1024</i>		
			CLE (Area 2, 3, or 7)	3	
			TOTAL	17	
SOPHOMORE FALL SEMESTER 2014		Credits	SOPHOMORE SPRING SEMESTER 2015		Credits
ESM 2104 Statics (C-) <i>Co: MATH 2114, MATH 2204</i>	3		ESM 2204 Mech of Deformable Bodies (C-)	3	
MATH 2224 Multivariable Calculus (C-) <i>Pre: MATH 1266, MATH 1224</i>	3		<i>Pre: ESM 2104, MATH 2204</i>		
PHYS 2306 Foundations of Physics I w/lab <i>Pre: MATH 1226, PHYS 2305</i>	4		ESM 2304 Dynamics (C-)	3	
AOE 2074 Computational Methods (C-) <i>Pre: ENGE 1216</i>	3		<i>Pre: ESM 2104, MATH 2204; Co: MATH 2214</i>		
AOE 2204 Intro to OE (C-) <i>Pre: ENGE 1114 (C-), PHYS 2305 (C-)</i>	3	[F,SI]	MATH 2214 Differential Equations (C-)	3	
CLE (Area 6)	1		<i>Pre: MATH 1226, MATH 2114</i>		
TOTAL	17		AOE 3094 Matrl's for Aero & Ocean Eng	3	[S,SI]
			<i>Pre: CHEM 1035; Co: ESM 2204, PHYS 2305</i>		
			AOE 3204 Naval Architecture (C-)	3	[S,SI]
			<i>Pre: 2204, ESM 2104, MATH 2204; Co: 2074</i>		
			CLE (Area 3, ECON 2005)	3	
			TOTAL	18	
JUNIOR FALL SEMESTER 2015		Credits	JUNIOR SPRING SEMESTER 2016		Credits
MATH 4564 Operational Methods (C-) <i>Pre: MATH 2214</i>	3		STAT 4705 Probability & Stat for Engr <i>Pre: MATH 2204</i>	3	
ME 3134 Fund of Thermodynamics (C-) <i>Pre: MATH 2214</i>	3		AOE 3054 AOE Experimental Methods (C-)	3	
AOE 3014 Aero/Hydrodynamics (C-) <i>Pre: 3104 or 3204, ESM 2304</i>	3		<i>Pre: 3014, 3024, and 3034</i>		
AOE 3024 Thin-Walled Structures (C-) <i>Pre: ESM 2104, ESM 2204</i>	3		AOE 3224 Ocean Structures (C-)	3	
AOE 3034 Vehicle Vibration & Control (C-) <i>Pre: ESM 2304, MATH 2214</i>	3		<i>Pre: 3024</i>		
CLE (Area 2, 3, or 7)	3		AOE 3264 Resist & Prop of Ships (C-)	3	
TOTAL	18		<i>Pre: 3014, 3204</i>		
			AOE 4214 Ocean Wave Mechanics (C-)	3	
			<i>Pre: 3014, MATH 4564</i>		
			AOE 4244 Marine Engineering (C-) <i>Pre: 3204; (ME 3134 or ME 3124)</i>	3	
			TOTAL	18	
SENIOR FALL SEMESTER 2016		Credits	SENIOR SPRING SEMESTER 2017		Credits
AOE 3044 Boundary Layer Theory <i>Pre: 3014, MATH 4564, ME 3134</i>	3		AOE 4266 Ship Design	3	
AOE 4265 Ship Design (C-) <i>Pre: 3054, 3224, 3264, 4214, 4244; Co: 4334</i>	3		<i>Pre: 4265</i>		
AOE 4254 Ocean Engr Lab <i>Pre: 3054, 3264</i>	1		Technical Electives	3	
AOE 4334 Ship Dynamics <i>Pre: 3014, 3034, 4214; MATH 4564</i>	3		CLE (Area 2, 3, or 7)	3	
Technical Elective	6		Elective	3	
TOTAL	16		TOTAL	12	

Superscripted annotation in Credits column indicates that a course is known to be offered in terms other than when shown. Course offerings are subject to change and the availability of sufficient resources. Students should confirm course offerings in advance with their department. Core courses common to all AOE majors are listed in black. Major courses are listed in blue. OE primary majors with an AE secondary major may substitute 2204 for 2104 and 4265-4266 for 4065-4066 or 4065-4066 in their secondary AE major.

Curriculum for Liberal Education (CLE)

Consult the CLE Alphabetical Listing at: <http://www.cle.prov.vt.edu/guides/alpha.html>, CLE courses need to be completed prior to graduation. If a CLE course is double-counted to satisfy two different CLE areas, a free elective(s) must be taken to maintain a minimum of 133 credits.

CLE Area 1: Writing and Discourse (6 hrs)	ENGL 1105	(3)	ENGL 1106	(3)
CLE Area 2: Ideas, Cultural Traditions, Values Electives (6 hrs)		(3)		(3)
CLE Area 3: Society & Human Behavior electives (6 hrs)	ECON 2005	(3)		(3)
CLE Area 4: Scientific Reasoning and Discovery (8 hrs)	PHYS 2305	(4)	PHYS 2306	(4)
CLE Area 5: Quantitative and Symbolic Reasoning (6 hrs)	MATH 1205	(3)	MATH 1206	(3)
CLE Area 6: Creativity & Aesthetic Experience elective (1 hr)				(1)
CLE Area 7: Global Issues Elective (3 hrs)				(3)

Technical Electives: The AOE department requires 9 credits of technical electives, of which 6 credits must be AOE 3000-level or higher courses and the remaining 3 may be selected from the attached list of computer programming courses and other 3000-level or higher, approved technical courses.

Change of Major Requirements: In order to enter this restricted major, students must have: 1) Minimum 2.0 overall Virginia Tech GPA, 2) Minimum grade of C- or better in ENGE 1024 and ENGE 1114; 3) Minimum grade of D- or better in CHEM 1035, CHEM 1045, ENGL 1105, ENGL 1106, MATH 1205, MATH 1206, MATH 1224 and PHYS 2305. NOTE: Students that have completed all of the required coursework and have a 3.0 or higher Virginia Tech GPA are guaranteed this major. Change of Major applications are accepted prior to the beginning of fall, spring, and summer at: <http://www.enge.vt.edu/undergraduate/undergraduate-changing-majors>

Foreign Language Requirements: Students must have had 2 years of a foreign language in high school or one year at the college level (6 credit hours) of the same language. College-level credits used to meet this requirement do not count towards the degree.

Satisfactory Progress Towards Degree: University Policy 91 outlines university-wide minimum criteria to determine if students are making satisfactory progress towards the completion of their degrees. The AOE Department fully supports this policy. Specific expectations for satisfactory progress for Ocean Engineering majors are as follows:

- Each student must meet the minimum University-wide criteria as described in Policy 91 and summarized in the Undergraduate Catalog (under Academic Policies).
- After attempting 68 credit hours, students must have passed AOE 2074 and 3204.
- Students must maintain 2.0 overall and in-major GPAs.
(The in-major GPA consists of all courses taken under the AOE designation).

Prerequisites: Prerequisites for each course are listed after the course title. All AOE courses require a C- or better for prerequisite courses. There are no hidden pre-requisites in this program of study. Prerequisites may change from what is indicated. Be sure to consult the University Catalog or check with your advisor for most current requirements.

Graduation Requirements: Students must pass all required courses and both the in-major and overall GPA must be at least 2.0 or graduation. Only free electives and courses only offered on a Pass/Fail basis may be taken Pass/Fail. Courses on the College of Engineering list of non-degree credit may not be taken for credit towards graduation (list found at www.eng.vt.edu/forms)

AOE DEPARTMENT ELECTIVE REQUIREMENTS
For students graduating in calendar year 2017

AOE students have several types of electives required in their program of study. Listed below are departmental, College and University requirements governing those electives.

CURRICULUM FOR LIBERAL EDUCATION (CLE): Satisfaction of CLE requirements is required of all students in the university. Engineering students satisfy this requirement in Areas 1, 4, and 5 through curricular math, science and English courses. Areas 2, 3, 6, and 7 are satisfied through elective courses; 6 credits are required in Areas 2 and 3, 1 credit in Area 6 and 3 credits in Area 7. The one course required for Area 7 may, if carefully selected, simultaneously satisfy an Area 2 or 3 requirements. Several courses appear on both the Area 2 and Area 6 lists but can be used to satisfy only one of these requirements. Area 7 is the only area in which a course may “double count.” **All CLE requirements must be met with courses taken on an A/F basis unless a course is only offered on the P/F basis.** A link to the *University Curriculum for Liberal Education Guide* is maintained at <http://www.provost.vt.edu/>. Each year, courses may be added to or removed from each Area. A course may be used to satisfy an Area, if it appears on the list of approved courses for that Area during the year it was taken.

ECON 2005 (Principles of Economics) is required for graduation and may be taken as one of the two Area 3 requirements in the CLE. If a student chooses to satisfy the Area 3 requirements with courses not including ECON 2005, ISE 2014 (Engineering Economy) may also be used to satisfy this requirement but this requires additional credits.

VISUAL EXPRESSION, WRITING AND SPEAKING (ViEWS) Requirement (Writing Intensive requirement)
The ViEWS (or Writing Intensive) requirement will be met by taking the required senior level design courses (AOE 4x65 and 4x66).

MATH ELECTIVE: All AE students must take Math 4574 (Vector and Complex Analysis for Engineers), Math/AOE 4404 (Applied Numerical Methods) or Statistics 4705 (Probability and Statistics for Engineers) on an A/F basis. (Statistics 4705 is required for OE majors.)

TECHNICAL ELECTIVES: The AOE Department requires 9 credits of technical electives, all of which must be taken on an A/F basis. This includes 6 credits of AOE courses at the 3000 level or above and 3 credits from the list below. Students pursuing both AE and OE majors may fill all technical elective requirements with required courses from their second major. Courses other than those below may be acceptable as technical electives; however, any substitutions must be approved by the student’s course advisor *before the course is taken*. Students are responsible for the satisfaction of prerequisites required for their chosen technical electives.

- AOE: Any 3000 or higher level course not required in the student’s major
- CEE: 4674
- CHEM: 4615
- CS: 1044, 1054, 1064, 1114, 1124
- ECE: 3054, 4164, 4405, 4406, 4624, 4634, 4644
- ENGE: 2514
- ENGR: 3124
- ESM: 3054, 4024, 4044, 4114, 4154, 4614, 4714
- GEOG: 4354
- GEOS: 3114, 3024, 3034
- ISE: 4404
- MSE: 4055, 4056
- MATH: 3214, 4144, 4225, 4226, 4234, 4245, 4246, 4425, 4426, 4445, 4446, 4574 (if not used as math elective)
- ME: 4204, 4224, 4254, 4504, 4514, 4524, 4534, 4634, 4644, 4704, 4724, 4734
- NSEG: 3145, 3146
- PHYS: 3405, 3406, 3655, 3656, 4455, 4456, 4504, 4554, 4614
- STAT: 4105, 4106, 4705 (AE only, if not used as the math elective), 4706

FREE ELECTIVES may be any course you care to take (with the exception of the non-degree credit courses in the attached list) including PE, ROTC, Band, etc. If you have transfer credits or AP credit that did not satisfy one of your curriculum requirements, these may be used as free elective credits. Free electives may be taken on P/F basis provided the student meets the requirements for taking courses P/F and the course is offered on that basis.



Academic Affairs
212 Hancock Hall (0275)
Blacksburg, Virginia 24061
540/231-3244 Fax: 540/231-1831
E-mail: engris@vt.edu
http://www.eng.vt.edu/overview/acad_affairs.php

To: Engineering Undergraduates
From: Erik Westman, Associate Dean, Academic Affairs *EW*
Subject: Non-degree credit
DATE: April 2014

Please be aware that not all courses at Virginia Tech will count toward an undergraduate engineering degree. Such courses may not be used to satisfy any graduation requirement, including free electives. Listed below are courses which do not count toward an undergraduate engineering degree. This list is not exhaustive, so if you have any questions, you should check with your engineering department about additional non-credit courses. This list is updated periodically. Be sure to review the list each semester at: <https://www.eng.vt.edu/sites/default/files/pageattachments/non-degreecourses.pdf>

- CHEM 1015-1016 (Introduction to Chemistry)
- CHEM 1025-1026 (Introduction to Chemistry Laboratory)
- CS 1004 (Computer Literacy), (no credit awarded to CS majors for these courses: CS 4004, 4014)
- UNIV or EDCI 1004 (College Success Strategies), 1014 (Cadet Success Seminar), 1704 (First Year Seminar Course), 2004 (Exploring Careers), 4974 (Independent Study), 2984 (Special Study: Any Subtitle), 4984 (Special Study: Any Subtitle)
- ENGE 1354 (Spatial Visualization)
- EF/ENGE 2984 (Engineering Success Seminar)
- ENGL 1004, 0014 (English as a Second Language)
- ENGR 1034 (First Year Hypatia Seminar)
- ENGR 1054 (First Year Galileo Seminar)
- ENGR 3004 Mentoring Seminar; ENGR 4984 (CEED Team Leader Seminar)
- ESM 2984 (ESP Statics, Prof Dev Sem for ESM), ESM 4404 (Fundamentals of Professional Engineering)
- FCD 2984 (Success Project)
- HD 2984 (Healthy Living, Success Project)
- MaSc 1024, 1025, 1026 (Mathematics, A Liberal Arts Approach), 1034 (Statistics, A Liberal Arts Approach), 1044 (Computer Science, A Liberal Arts Approach)
- MATH 1504 (PreCalc), 2984 (Emerging Scholar), 1015 (Elem Calc with Trig. CS majors may receive 1015 credit if taken before 1205), 1016 (Elementary Calc with Trig), 1525-1526 (Elementary Calc with Matrices), 2015-2016 (Elementary Calc with Trig II)
- ME 4984 (SAE Automotive Essentials)
- PHYS 2205-2206 (General Physics, not Calc-based)
- PSYC 2984 (First Year Experience, Athletic Transitions)

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