Mechanical Engineering

Undergraduate
On-Campus Student Handbook

2015-2016

Every effort has been made to ensure that the information in this handbook is accurate and up-to-date. However, for official information on academic policies and requirements, please see the UND Academic Catalog - http://und.edu/academics/registrar/catalog-current.cfm.

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Introduction

Welcome to UND Mechanical Engineering! The faculty and staff of the Department and the College of Engineering and Mines are committed to helping you achieve your professional goals. Your undergraduate engineering education will form the foundation of a lifetime of learning and achievement. Make the most of the opportunities available to you.

This handbook compiles advice on various topics of potential interest to on-campus students in the UND Mechanical Engineering Program. It is current and accurate to the best of our knowledge, but is not intended to be all-inclusive. For current updates, communications from the Department, job and co-op opportunities, etc., please make sure you are a member of the ME Student Information community in Blackboard. This will be the forum used by the Department for announcements of upcoming events, course information, etc. If you do not see ME Student Information listed when you click on the 'Community' link at the top of the screen after logging into Blackboard, please contact Dr. Cavalli, Chair of the ME Department, at matthew.cavalli@engr.und.edu or 701-777-4389. For general questions about using Blackboard, please click on the 'Blackboard Help' link.

We have also established a group in the social networking site LinkedIn, UND Mechanical Engineering. Over 400 UND ME alums are part of the group. They represent a network of practicing professionals (many working as engineers, but others in fields including law, business, and philanthropy, too) with the potential to help you expand your career opportunities. We encourage you to establish a LinkedIn profile and request both a connection to Dr. Cavalli and access to the UND Mechanical Engineering group.

If you have questions about ME Student Information, the UND Mechanical Engineering LinkedIn group, this Handbook, or any other topic, please don't hesitate to contact Dr. Cavalli.

Once again, welcome to UND ME.

Where to Go? Who to Ask?

Sometimes the hardest part about getting a question answered is just knowing who to ask. One resource is sitting next to you in every class – chances are there is someone else nearby who has dealt with the same issue. However, finding that out would require actually (gasp!) introducing yourself and getting to know them. Failing that, here are a few suggestions:

CEM Peer Mentors

All incoming ME first-year students will be assigned a peer mentor. The mentor will be another student in CEM (sophomore level or higher), whose role is to help you adjust to UND and increase your chances for success. They are a good first contact for most questions you might have and, in some cases, for questions you don't even know to ask, yet. Mentors and Mentees will communicate and meet regularly throughout the academic year but feel free to contact your mentor outside of 'normal' meeting times.

Departmental Questions

- Questions about registration permission numbers for ME/ENGR courses, advisor holds, purchases for class projects, electronic door access, purchasing safety glasses – Kris and Kristie in the ME Office
- Questions about transfer equivalencies, co-op enrollment, graduation requirements, concerns about issues in the department or other issues not listed – Dr. Cavalli
- Questions about student groups in ME and CEM – Dr. Cavalli (general questions), Dr. Semke (ASME), Dr. Zahui (FSAE), Dr. Neubert (Robotics), Dr. Gupta (Materials Advantage)

Laboratory Questions

- Questions about using equipment in the shop area (102, 104, 105, 106D, 111 UP I) – Jay Evenstad and Gary Dubuque
- Questions about individual faculty lab or project spaces – the faculty member(s) listed on the door or Dr. Cavalli

CEM Questions

- Questions about FE exam reviews, Order of the Engineer, CEM K-12 outreach activities, the CEM Living Learning Community – Stacie Klegstad
- Questions about distance courses during a co-op – Dr. Cavalli or Courtenay White
- Questions about student groups in CEM – Dr. Ness (Tau Beta Pi), Stacie Klegstad (other groups)

Computer Lab Questions

- Questions about door access or general questions or concerns – Kristie in the ME Office
- Questions about printing, non-functional equipment, etc. – Follow the procedures posted in each lab to submit a help ticket to the CEM IT Department (believe it or not, they are not psychic and just leaving the problem will not magically get it fixed)

Other Academic Questions

- Questions about minors/certificates outside of CEM, registration permission numbers for non-ME/ENGR courses – contact the applicable department directly
- Questions about tutoring/help sessions provided by Math, Chemistry, etc. – contact the applicable department directly

Other Non-Academic Questions

- Questions about student financial aid, transcripts, errors on your student record, parking tickets, etc. – contact the One-Stop on the first floor of the Memorial Union
- Questions about co-ops – Dr. Cavalli and/or the Career Services Office (280 McCannel Hall)
- Questions about on-campus employment – Career Services Office/website

If you have a question not covered above, Dr. Cavalli is a good place to start.

Contact Information

Mechanical Engineering Department

ME Office Staff (Ms. Kristin Pavlish (Kris), Ms. Kristie Wolff), 266 Upson II, 701-777-2571
kristin.pavlish@engr.und.edu / kristie.wolff@engr.und.edu
Dr. Forrest Ames, Professor, 366H Upson II
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Dr. Matthew Cavalli, Associate Professor and Department Chair, 266A Upson II
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Dr. Surojit Gupta, Assistant Professor, 274 Upson II
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Mr. Dustin McNally, Senior Lecturer, 207 Upson I
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Dr. Jeremiah Neubert, Associate Professor, 267 Upson II
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Dr. Cai Xia Yang, Assistant Professor, 280 Upson II
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Dr. Marcellin Zahui, Associate Professor, 269 Upson II
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Mr. Jay Evenstad, Research Associate, 104 Upson I
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Mr. Gary Dubuque, Research Associate, 104 Upson I
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College of Engineering and Mines

Ms. Janet Honek, Undergraduate Experience Coordinator, 365C Upson II
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Ms. Stacie Klegstad, Student Experience Assistant, 365 Upson II
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Ms. Mojdeh Mardani, Undergraduate Experience Coordinator, 365B, Upson II
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Dr. Joel Ness, Undergraduate Experience Director, 365D Upson II
joel.ness@engr.und.edu, 701-777-6149
Ms. Courtenay White, Distance Education/Student Experience Specialist, 365 Upson II
courtenay.white@engr.und.edu, 701-777-4333

Curriculum and Advising

Mechanical Engineering Curriculum – 2015-2016

FRESHMAN YEAR

			Cr Hr					Cr Hr
MATH	165°	Calculus I	4		MATH	166°	Calculus II	4
CHEM	121°	Gen Chem I & Lab	4		PHYS	251°	Univ Phys I & Lab	4
ENGL	110°	College Comp I	3		ENGR	200°	Comp App in Eng	2
ME	101+°	Intro to Mech Eng	3		ENGL	130°	Writing for Public Aud	3
____	___	Arts & Humanities	3		___	__	Arts and Humanities	3
			17					16

SOPHOMORE YEAR

			Cr Hr					Cr Hr
MATH	265°	Calculus III	4		MATH	266	Elem Diff Equations	3
PHYS	252°	Univ Phys II & Lab	4		ENGR	206	Circuit Analysis	3
ENGR	201°	Statics	3		ENGR	202°	Dynamics	3
ME	201+	Student Design	2		ENGR	203°	Mech of Materials	3
ME	341°	Thermodynamics	3		___	__!	Lab Science	4
			16					16

JUNIOR YEAR

			Cr Hr					Cr Hr
ME	301	Material Science	3		ME	323+	Mach Comp Des & Lab	4
ME	306	Fluid Mechanics	3		ME	418	Manuf Proc & Lab	4
ME	322	Design of Mach	3		ME	474	Heat and Mass Transfer	3
ENGR	460	Engr Economy	3		MATH	321$	Applied Statistical Meth	3
___	__¥	Technical Elective	3		___	__	Technical Elective	3
			15					17

SENIOR YEAR

			Cr Hr					Cr Hr
ME	480	Mech Eng Seminar	3		ME	488+	Eng Design	3
ME	483	Mech Meas Lab	3		___	__	Prof Eng Ethics*	3
ME	487+	Eng Design	2		___	__	Soc Sci or Arts & Hum**	3
___	__	Social Science	3		___	__	Technical Elective	3
___	__	Technical Elective	3		___	__	Technical Elective	3
___	__	Technical Elective	3					
			17					15

+ This course involves the design and fabrication of an engineering prototype
° This course must be completed with a grade of 'C' or better
! PHYS 253/L or CHEM 122/L unless an alternate course is approved by the ME Department
¥ One Technical Elective can be taken from other engineering departments, Math or Physics (300+ level)
*Can be ME 370, ChE 340 or PHIL 250
**Choose a Social Science if taking PHIL 250 (formerly PHIL 370), an Arts & Humanities if taking ME 370 or ChE 340
$ An alternative calculus-based (calculus as lowest prerequisite) statistics course can be substituted w/approval of the ME Department

Technical Electives and Optional Concentrations

See the complete list of technical electives in the academic catalog. One technical elective must be taken from each stem unless the student is pursuing the Aerospace Concentration (see below). Students may receive an *optional* concentration, documented on the transcript, in one of the listed stems as indicated.

Students who satisfactorily complete two Cooperative Education (ME 397) experiences for a combined total of at least 3 credit hours are granted a waiver for one technical elective, provided one of the Cooperative Education experiences lasts for the duration of either a fall or spring semester and all reporting requirements are met (see co-op handbook posted on ME Student Information). The waived technical elective is considered an elective at large and is not specified into any one of the three stems. Students are eligible to enroll in ME 397 after completion of the requirements for admission to the Professional Degree Program (see Advising section of this handbook).

Mechanical Design Concentration - 129 hours

Requires ME 323/323L and any four of the Mechanical Design Stem technical electives

Thermal Sciences Concentration - 129 hours

Requires ME 306, ME 341 and any four of the Thermal Sciences Stem technical electives

***** If considering the Thermal Sciences Concentration, it is strongly suggested that you take ME 342 as soon as possible because it is a prerequisite for several other technical electives. *****

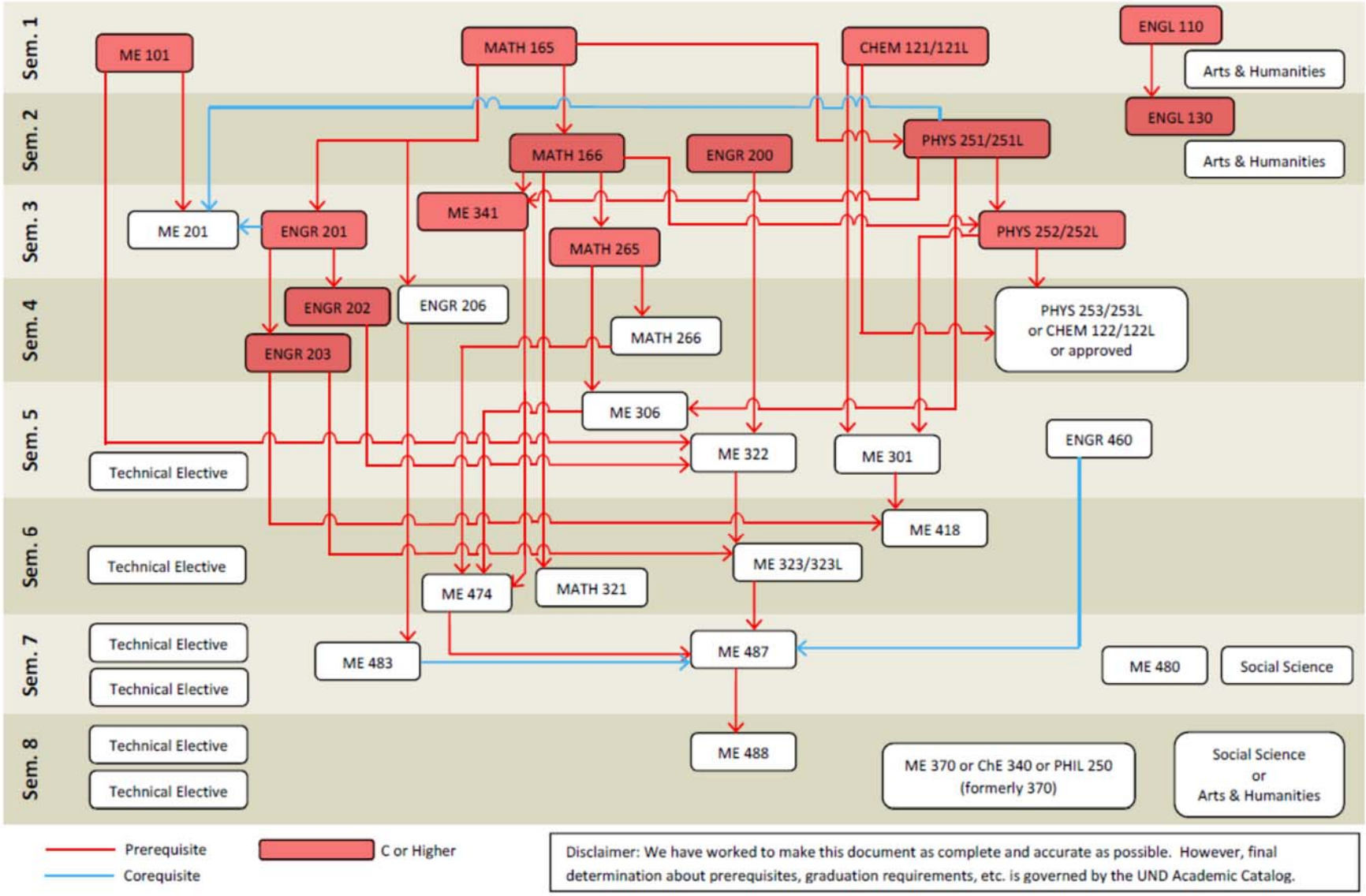
Manufacturing and Materials Concentration - 129 hours

Requires ME 418 and any four of the Manufacturing and Materials Stem technical electives

Aerospace Concentration - 134 hours

The aerospace concentration requires students to complete Avit 102, Introduction to Aviation (5 credits) plus six technical electives. Avit 102 includes earning a private pilot's license and is recommended for the summer session between the freshman and sophomore years. Proof of completion of the requirements for a private pilot's license outside of UND will be accepted in place of Avit 102 for the concentration. Technical electives must be chosen from the aerospace group of electives as identified by # in the technical elective listing. One of the technical electives must be either ME 429 or ME 464. ME 490 or ME 590 may also be included in the aerospace group at the discretion of the Mechanical Engineering Chair.

Mechanical Engineering Program Map – 2015-2016



Advising

Each student is assigned a faculty advisor. This advisor will change as you reach various milestones in the program. Your current faculty advisor should be displayed in Campus Connection - **verify your advisor each semester prior to registration**.

Students must meet with their advisor each semester prior to enrolling in classes for the subsequent semester. Prior to their advising appointment, the two-page Advising Sheet (available from ME Student Information in Blackboard or the ME Office) should be completed by the student. **The form should be brought to the advising appointment**. Also before the advising session, **run a degree audit in Campus Connection** (Degree Progress/Graduation -> My Academic Requirements) to confirm that the Registrar's official academic record for you is consistent with your own records. If you find any discrepancies, discuss them with your advisor during the advising appointment and, if changes need to be made to your record, please contact Dr. Cavalli. *The advising session is also an excellent opportunity to make use of the faculty's professional experiences and to discuss topics like career opportunities, co-operative education, graduate school, etc. Don't just focus on the class schedule – what comes next and how will you get there?*

Enrollment in most Junior-level and Senior-level engineering courses (with the exception of ME 341, ME 306, and ENGR 460), requires admission to the Professional Degree Program (PDP). Admission to the PDP requires the completion of core engineering, math and science courses. You can find a worksheet with all courses required for admission to the PDP listed in the Advising section of ME Student Information. When you complete your Advising Sheet, check the appropriate box corresponding to your status in the PDP.

After the advising session, the first page of the completed Advising Sheet should be returned to Kristie in the ME office. She will remove your 'CEM Advisor Hold' and review/update your PDP status in Campus Connection, as needed.

Register as soon as you can each semester. In order to do this, plan ahead and schedule an advising appoint/communicate with your advisor at least a week ahead of your registration date listed in Campus Connection. You can go back later and drop or change classes if your plans change (through the end of the drop/add period each semester without penalty). Popular classes will fill up - grab a spot early. This is true for all classes but particularly true for lab classes - class size is limited both by the physical dimensions of the laboratory/available lab stations and the amount of time the instructor can spend with each group to give the desired educational experience.

Advising is part of the expected duties of ME faculty members. However, ME faculty are only on contract from mid-August to mid-May. Faculty that are present in the summer are typically on campus specifically to teach a class or conduct research. If you have not completed your advising appointment by May 15, do not expect your advisor to be available until just before the start of the fall term. General program questions can be addressed Kristie or Dr. Cavalli, but you must contact your advisor to register for classes.

Essential Studies

As a comprehensive institution of higher education, UND requires that all graduates meet basic requirements in the breadth and depth of their educational experience. These requirements are collected in what is called the Essential Studies program. A worksheet to help ME majors complete the Essential Studies requirements has been posted on ME Student Information. **It is important to note that courses approved for Essential Studies credit may change from term-to-term. Students are responsible for verifying the Essential Studies status for any courses for the term of interest prior to enrolling. This can be done by visiting the Essential Studies portion of the UND website, http://und.edu/academics/registrar/essential-studies-approved-courses.cfm.**

Milestones in the ME Curriculum

The first milestone in any engineering curriculum is successful completion of Calculus I (MATH 165). This is not the end of the required mathematics courses, but is a prerequisite for most engineering coursework and should be completed as soon as possible.

Familiarize yourself with the research interests of the ME and CEM faculty. Talk to the faculty about potential opportunities to get involved with research projects, independent study projects, etc. Involvement with extracurricular engineering projects is a great way to better understand the course material and is highly valued by employers.

Every semester – plan to attend the Engineering and Aviation Day of the Career Fair (see the Dates and Deadlines section for typical timing). Dress up, put together a current resume (contact Career Services to make an appointment for them to review and polish it), and use the Fairs as opportunities to network, learn about current opportunities, and practice for the time when you are looking for either a co-op placement or new job.

By March 1 each year - complete the CEM scholarship application. This is done electronically through Academic Works - https://und.academicworks.com/. The system will automatically link you to scholarships within CEM and across the campus for which you are eligible. You will only be considered if you apply. Selection criteria vary depending on the scholarship.

During spring registration of your sophomore year – you should have completed the requirements to be admitted to the Professional Degree Program and should note it on your Advising Sheet. This must be completed to be eligible to take any 300-level ENGR or ME course (with the exceptions of ME 306, ME 341, and ENGR 460).

End of your sophomore year - consider a co-op (ME 397) or internship experience. You can find more information about participating employers at the UND Career Services website, or the Fall or Spring UND Career Fair. Or feel free to contact other employers on your own.

At least four semesters prior to graduation - you should be taking ME 322. ME 322 (fall-only course) is a prerequisite for ME 323 (spring-only course) which is a prerequisite for ME 487 (fall-only course) which is a prerequisite for ME 488 (spring-only course). For on-campus students, if you plan on being absent from campus for a co-op experience, it may be possible to complete one or more of these courses in the Distance Engineering Degree Program (DEDP)

format. There are additional administrative fees associated with DEDP courses, but this may be preferable to delaying graduation by one or more semesters by being out of sequence. Talk to your advisor or Dr. Cavalli for more information.

At least three semesters prior to graduation – you should have completed or be enrolled in a thermal sciences elective or ME 474. This is one of the prerequisites for ME 487. **Note that the prerequisites for ME 487/488 will not be waived – if you have not completed them on time, you will have to wait an additional year.**

At least two semesters prior to graduation - **run the degree audit in Campus Connection** (Degree Progress/Graduation -> My Academic Requirements). This will show you the official record of your academic progress kept in the Registrar's office. If you think there are discrepancies or errors, contact your advisor or Dr. Cavalli.

At least two semesters prior to graduation - visit with your advisor or Dr. Cavalli about the Combined Degree Program (dual undergraduate/graduate degree) to potentially receive credit for some technical electives towards both your BSME and MSME degrees.

At least one semester prior to graduation - register for the Fundamentals of Engineering examination. Check with the Student Experience and Outreach Office (3rd floor, Upson II) for the specific deadlines. This is the first step to becoming a registered professional engineer. While many of us may not need to regularly sign engineering drawings or provide expert testimony, registration is evidence of your pride and commitment to our profession and your dedication to excellence in engineering practice. The National Society of Professional Engineers represents the engineering profession to both the general public and to policymakers.

Early in the semester you plan to graduate - complete the application for graduation. You can find the application on the Registrar's website. For more information, contact the Student Experience and Outreach Office.

After you graduate - keep in touch. We send out biennial alumni newsletters about Department events, current students, and alumni achievements. We are always looking for great stories to tell. And if you are interested in coming back to share your professional experiences with future students, please let us know.

Typical Dates and Deadlines **(check the ME office for exact dates):**

- Faculty/alumni/student mixer – first Friday of the fall semester
- Registration for Spring Classes – mid-to-late October
- Registration for Summer/Fall Classes – early April
- Application for Graduation – within the first month of the semester you plan to graduate
- Applications for UND, CEM, and ME Scholarships – March 1 (annually)
- CEM Design Exposition – Last Tuesday of the spring semester
- ASME Scholarship Banquet – Last week of spring semester
- FE Exam Deadlines – contact the CEM Student Experience and Outreach Office and refer to www.ncees.org for more information

Labs and Shops

Shop, Lab and Building Access

All labs and shops are available for student use with faculty or staff supervision. Some labs and shops are available for either key or electronic card access for students working on particular projects, enrolled in certain departments, etc. If you have questions about access to specific labs or shops (or after-hours access via the external building doors), please contact Kristie or Dr. Cavalli.

ME Labs and Shops

100 Upson I - Multipurpose Laboratory Space (Ames)
101 Upson I - ME 101 Workshop
102 Upson I - Student Machine Shop
104 Upson I - Main ME Shop
105 Upson I - Welding Shop
106 Upson I - Multipurpose Laboratory Space
106A Upson I - Senior Design Workroom
106D Upson I - Aluminum Foundry
111 Upson I - Wood Shop
114 Upson I - Multipurpose Laboratory Space (Ames/Cavalli/Gupta/Semke/Zahui)
115 Upson I - Multiphase Fluid Flow Laboratory (Tang)
200/200A Upson I- Robotics and Intelligent Systems Laboratory (Neubert)
201C Upson I - Noise and Acoustic Vibrations Laboratory (Zahui)
217 Upson I - Unmanned Aircraft Systems Engineering Laboratory (Semke)
218 Upson I – CEM Computer Lab
219 Upson I - Unmanned Aircraft Systems Engineering Laboratory (Semke)
221 Upson I - ME 483/ME 101 Manufacturing Laboratory
222 Upson I - CEM Computer Lab
12 Upson II - Materials Processing and Analysis Laboratory (Cavalli/Gupta)
264 Upson II - ME Junior/Senior Computer Lab

Multidisciplinary/Other CEM Labs and Shops

213 Harrington Hall - Integrated Systems Engineering Laboratory (ISEL)
225 Harrington Hall - CEM Computer Lab
112 Upson I - Civil Engineering Soils, Asphalt and Concrete Laboratory
113 Upson I - Petroleum Engineering and Civil/Mechanical Engineering Structures Laboratory
16/17 Upson II - Materials Characterization Laboratory

Engineering Computing and Software

Computers

There is no required personal computing package for the ME Department. Most laboratory computers are PCs, but some faculty and staff also run Apple and Unix machines. Multiple computer labs exist in the Upson-Harrington engineering complex and many on-campus students find it convenient to work in one of these labs. Some students find it convenient to purchase their own desktop or laptop computers. Student discounts on Dell computers are available at www.dell.com/epp.

Note that, due to software compatibility and performance requirements, it is strongly recommended that a desktop or laptop be used rather that a tablet, particularly for classes requiring programing, simulation, etc. Some tablets may have the processor and memory capabilities for running at least some of the engineering software packages, but they will likely require that Windows be installed.

Software

Most of the engineering software packages available in the engineering computer labs are also available over the university network (on-campus students) or via the CITRIX server (on-campus or DEDP students). Student versions of some software packages are available. However, you should be aware that student, academic, and commercial versions of the same software package may not be compatible. Help with software issues is available via Live Help at UND.techsupport@email.UND.edu or 701-777-6305.

Several courses throughout the ME curriculum make use of the MATLAB computer program. An introductory experience with MATLAB is provided in ENGR 200. However, high quality tutorials and refreshers are also available through the MathWorks website: http://www.mathworks.com/academia/student_center/tutorials/launchpad.html.

Printing

Student printing is completing using the uPrint system. uPrint kiosks are located across campus. A student can send a printing job to the system from any networked computer and then release (print) the document at the kiosk of their choosing. Students in the College of Engineering and Mines receive $18 (450 black and white pages) for printing each semester. Funds for additional printing can be added using the uPrint system, https://webprint.und.edu.

Student Groups

Student organizations play an important role in both professional and social activities in the Department and School. Involvement in these organizations gives students the opportunity to expand their professional network, participate in planning and conducting events ranging from K-12 outreach to fundraising to professional seminars to peer tutoring, and to learn more about the profession. Leadership roles in student organizations can also be a valuable addition to your resume.

American Society of Mechanical Engineers - The student ASME chapter sponsors various social and professional events throughout the course of the year. For students interested in leadership and professional development, participation in ASME is a great way to get involved. Contact Kristie in the ME office or Dr. Semke for more information about current ASME officers and upcoming meetings.

Materials Advantage – A student group representing several materials-focused professional societies (ACerS, AIST, ASM International, TMS), Materials Advantage provides opportunities for networking and professional development in the area of materials behavior. Contact Dr. Gupta for more information.

Society of Automotive Engineers - While not an official SAE Collegiate Chapter, the Formula SAE Team is active in designing and building formula cars for competition. Participation is open to all engineering students (and non-engineers, as well). Team members contribute through engineering design, fabrication, business planning, fundraising and participation in outreach events. Contact Dr. Zahui for more information.

Society of Women Engineers - SWE is open to all engineering students and is very active in educational outreach events around the community. Contact Ms. Mojdeh Mardani for more information.

Tau Beta Pi - The original engineering honor society is open to the top eighth of the junior class and the top fifth of the senior class (by GPA). At UND, Tau Beta Pi participates in various events like tutoring in science, math and engineering as well as fundraising and outreach events. Contact Dr. Ness for more information.

Robotics Club -The Robotics Club participates in K-12 outreach related to robotics topics. They also regularly compete in events like the NASA Robotic Mining Competition. Contact Dr. Neubert for more information.

Tutoring and Academic Resources

Your primary academic resource for any given class is the instructor – ***go to class, pay attention, ask questions and do the work!*** But sometimes that's not enough. Some classes will be harder for you than others. If you feel yourself struggling, don't wait – contact the instructor as soon as possible (email, office hours or phone – most instructors will let you know their preferred methods for communication). It can be intimidating, but you will find that most faculty are ready and willing to help. But we don't know there is a problem unless you tell us. Another excellent resource is sitting in the seat next to you – form study groups with other students in your classes. You will develop a deeper understanding if you have to convince someone else you know what you are talking about than when you just read through the book on your own.

In addition to these options, other resources are available on campus:

American Indian Student Services - cultural and support services specifically tailored to American Indian students at UND; aiss@email.und.edu; 701-777-4291

Disability Services for Students - information and assistance for students dealing with disabilities that may impact their UND experience; und.dss@email.und.edu; 701-777-3425

Math Learning Center - individual and group tutoring for mathematics courses; gwennie.beard@und.edu

Mechanical Engineering - graduate student and upper division tutors may be available in the evenings for help in math, science and foundation engineering mechanics courses – contact Dr. Cavalli for more information

Multicultural Student Services - cultural and support services specifically tailored to multicultural students of all nationalities at UND; http://und.edu/student-life/multicultural-student-services/; 701-777-4259

Physics Department - group tutoring is typically offered in the afternoons and evenings; physics@email.und.edu; 701-777-2911

Student Success Center Drop-In Tutoring - scheduled tutoring for specific courses across UND; und.ssc@email.und.edu; 701-777-2117

Tau Beta Pi - junior/senior engineering students providing tutoring in math, science and engineering courses - see posted signs in CEM or contact Dr. Ness for more information

Writing Center - help with developing written reports/assignments from the planning stage through the final draft; http://und.edu/academics/writing-center/; 701-777-2795

Education Beyond the Classroom

Undergraduate Research

Involvement in research projects as an undergraduate student can offer many advantages including 1) experience with modern laboratory equipment and methods, 2) exposure to engineering topics outside those covered in typical courses, and 3) the opportunity to gain course credit or be paid for the work. The first step in being involved with research projects is to find a faculty member with whom you want to work. Recent research projects and scholarly activities for faculty include:

Ames - turbulence and heat transfer in gas turbine engines
Bibel - airplane crashes, train crashes
Cavalli - manufacture and repair of fiber composites, fatigue of composites, diffusion bonding of iron, nickel, and titanium, engineering education
Grewal - fluidized bed combustion
Gupta - advanced ceramics and manufacturing processes, green materials, 3D printing
Neubert - robotics, machine vision, engineering education
Semke - active motion control, unmanned aerial vehicles, engineering education
Tang - two-phase flow, flow in micro-channels
Yang - dynamics and controls
Zahui - vibrations, mechanical fatigue, control systems

Cooperative Education and Internships

Co-ops and Internships are opportunities to gain practical engineering experience prior to graduation. In addition to being an opportunity to make good money doing interesting work, the practical experience gained during a co-op or internship typically gives students a much more mature perspective on their remaining coursework. **During a co-op, a student is enrolled in ME 397 for 1 credit (20hrs/wk) or 2 credits (40 hrs/wk) and is paid as an entry level engineer. For purposes of financial aid, students are considered either half-time (1 credit of ME 397) or full-time (2 credit) students – if you have questions about your specific question, please see the Student Financial Aid office. Students taking ME 397 must meet certain performance and reporting requirements to get academic credit. See the co-op handbook on ME Student Information.** An internship is a less formal arrangement (the student is not enrolled or considered a part-time/full-time student and receives no academic credit) but carries the same practical experience. Future employers tend to view participation in co-ops and internships very favorably. Current co-op and internship opportunities can be located by visiting the career fairs (each fall and spring), the UND Career Services website, or the ME Student Information Community in Blackboard. Students participating in co-ops or internships may be able to enroll in one or more classes as part of the Distance Engineering Degree Program (DEDP). These courses carry additional administrative fees and it is not easy to work full-time and take courses, but this offers students another option for their academic planning.