

AET A131 – Structural Drafting
Sections 001 and 201, CRNs 30190 and 35983
3 credits, Spring 2014

Instructor: J. Ellen McKay

Office: UC 125
Office Phone: (907) 786-6424
Office Hours: By appointment
IPhone: (907) 240-3869

Secretary: Shana Kreh
Office: UC 130
Phone: (907) 786-6465
Hours: 8:00 am – 5:00 pm

Course meeting time and location

This course meets from February 17, 2014 through March 28 on Mondays – Thursdays from 8:00 AM to 11:30 AM in UC 123 and via Collaborate. Please attend in person if you can. This is an intensive 5-week course. Expect to spend 25-30 hours per week on the class.

Course description

Introduces technical skills needed by structural drafters and technicians to work with structural engineers. Includes office practices, staff relationships, and structural drawing production. Develops computer-aided drafting skills in symbols, conventions, dimensioning systems, sheet organization, code analysis, and research methods for steel, masonry, wood, and reinforced concrete buildings.

Course design:

3 credits (2 hours lecture + 3 hours lab)
Total time of student involvement: 135 hours
1) Lecture: 30 hours
2) Lab: 45 hours
3) Outside: 60 hours

Texts

Goetsch, D.L. (1994). Structural Drafting (2nd ed.). Albany, NY: Delmar.

Equipment and software/applications

For CADD work, a higher end PC is strongly recommended. Here is the recommended configuration as of August 2013:

- Intel® Core i7 2600 GHz processor 16GB RAM
- 500 MB Hard Drive Space
- Keyboard and three button mouse
- Microsoft 7 operating system preferred
- A headphone with microphone system (approximately \$8-15) is required for those participating via Collaborate
- Dial up internet connection, 29.8 Kbps minimum. A high-speed connection is recommended.
- Software- recent versions of
 - Antivirus software

- Java
- Chrome or Mozilla Firefox browsers
- Microsoft Word
- Microsoft Excel
- Adobe Reader
- Flash Player
- Windows Media Player (maybe)
- CADD software
Depending upon the specific class, the software requirements are the most recent versions of:
 - Autodesk AutoCAD
 - Autodesk Civil 3D
 - Autodesk 3D Studio
 - Revit Architecture
 - Revit Structural
 - Revit MEP

These are expensive products to buy individually. They are available in the UAA labs for the AET program and the satellite labs across the UAA system. The packages are also available as [time-limited free downloads from Autodesk](#)

Prerequisites

AET A102 and AET A181

Instructional goals and learning outcomes

Instructional Goal:

To introduce students to the professional practices of a structural engineering office in the creation of contract documents for steel structural systems, masonry structural systems, wood structural systems, and concrete structural systems.

Defined Outcomes:

Student Outcomes	Assessment Procedures
After successful completion of the course, the student will be able to do the following:	This outcome will be assessed by one or more of the following:
Demonstrate an understanding of class lab and safety procedures.	Class participation.
Describe the roles and relationships between structural drafter, technician, structural engineer and other consultants.	CADD projects and written exams.
Define the use of time sheets, budgets, and cost accounting procedures.	CADD projects and written exams.
Demonstrate a working vocabulary of structural engineering terminology.	CADD projects and written exams.
Demonstrate a familiarity with building codes, association standards, and manufacturing information	CADD projects and written exams.

effecting structural design.	
Describe and differentiate the use, preparation, and reproduction of structural drawings including plans, elevations, sections, details, schedules, and general notes in acceptable industrial standards, using symbols and drawing conventions as they apply to concrete, masonry, steel, and wood structural systems using CADD.	CADD projects and written exams.
Construct and correlate structural engineering specifications based on their format and acceptable industrial standards.	CADD projects and written exams.
Explain the involvement of the drafter or technician in relation to changes in both working drawings and specifications.	CADD projects and written exams.
Explain elementary structural statics principles, including loads, forces, and properties of areas.	CADD projects and written exams.

Course activities

Class sessions will consist of lecture/discussions and individual projects completed using CADD software and manual techniques in sketching and lettering. Emphasis will be on realistic assignments that duplicate structural engineering office procedures and terminology.

Course outline

- 1.0 Safety Procedures
 - 1.1 University policies
 - 1.2 Course and lab procedures
 - 1.3 Hazardous materials – blueprinting equipment
 - 1.4 Right-to-know information
 - 1.5 MSDS information
 - 1.6 Emergency egress review
- 2.0 Structural Design Team
 - 2.1 Role relationships
 - 2.2 Consultants
 - 2.3 Timesheets and cost accounting
- 3.0 Structural Contract Documents
 - 3.1 Shop drawings
 - 3.2 Design/ engineering drawings
 - 3.3 Specifications
- 4.0 Structural Statics
 - 4.1 Types of loads
 - 4.2 Forces
 - 4.3 Properties of areas
- 5.0 Structural Steel Members
 - 5.1 Shapes
 - 5.2 Composites
 - 5.3 Sizes and uses

- 5.4 Connection methods
 - 5.4.1 Bolt sizing (AISC)
 - 5.4.2 Angle sizing (AISC)
 - 5.4.3 Welding
- 6.0 Masonry Construction
 - 6.1 Types of masonry
 - 6.2 Grout
 - 6.3 Mortar
 - 5.4 Steel reinforcement
- 7.0 Wood Construction
 - 7.1 Dimensional lumber
 - 7.2 Glue laminated structural units
 - 7.3 Wood joists
 - 7.4 Wood panels
 - 7.5 Connection methods
- 8.0 Concrete
 - 8.1 Types and uses
 - 8.2 Admixtures
 - 8.3 Concrete formwork
 - 8.4 Columns
 - 8.5 Beams
 - 8.6 Steel reinforcement
 - 8.7 Concrete placing drawings
 - 8.8 Cast-in-place
 - 8.9 Pre-cast
 - 8.9.1 Pre-stressed
 - 8.9.2 Post-tensioned

Calendar of topics and assignments

See separate file named AET 131sprsched.docx

Assessments

Evaluation will be based on objective and subjective testing, successful completion of assigned projects, successful completion of sketching and lettering projects, attendance, and student notebook/portfolio. Grades will be A – F. Specific evaluation procedures will be discussed during the first class session.

Grading scale and assignments

Grades for the course will be determined by a combination of points earned. A total of 1600 points may be earned by a variety of course related activities. Grade requirements are as follows:

A	1485 – 1600	(93%)	
B	1370 – 1484	(86%)	
C	1255 – 1369	(79%)	
D	1140 – 1245	(71%)	(115 point spread)

Points may be earned in the following ways:

- Five (5) tests at 100 points each. Tests will be open book and open notes.
Note: Tests may be retaken for credit only once. If you miss the original test you will only be eligible for the make-up test.
- Six (6) drawing projects at 100 points each. The drawing projects will be evaluated in the following categories:

File	(10 points)	Drawing file in the proper file on the server; uploaded in proper format to Blackboard
Accuracy	(10 points)	Drawing accurately completed according to project instructions
Linework	(20 points)	Use of proper line type and line weight
Lettering	(10 points)	Consistent lettering <u>in class standard font</u> ; sizes according to project instructions
Dimensions	(10 points)	Dimensions conform to standard practice and project instructions, are well spaced and are located to facilitate readability.
Scale	(10 points)	Project is plotted to scale specified in project instructions; paper space viewport edge does not print
Standards	(10 points)	Following class drafting standards for sheet organization including titleblock and drawing reference
Composition	(10 points)	Use of mock-up, overall layout and aesthetics of the drawing
Timesheet	(10 points)	Timesheet accompanies project and is an accurate reflection of the time spent on the drawing
Deadline		Unless prior arrangements are made with the teacher, all projects are due on the deadline. Projects will be assessed 5 points for each class period late.

- One (1) Final Project at 300 points. The final project will be graded on the regular project criteria plus an expansion of the technician's ability to understand and apply the already completed course projects. Note: NO POINTS will be given for a project turned in after the end of the last class period.
- One (1) Timesheet at 100 points. The completed timesheet will be due at the end of the course. It will provide an accurate record of the amount of time spent on each drawing project (in and out of class). A copy of the timesheet will also be collected with each project. Evaluation of timesheets will be based on accuracy of information.
- Classroom attendance at 100 points. Attendance is worth 5 points per day. Students will be assessed one (1) point for being late and/or one (1) point for leaving before the end of class. Students are required to attend regularly and participate actively.
- Students are responsible for class work even if there is a legitimate excuse for their absence. Unexcused absences may result in the student being dropped from the class or receiving a failing grade. University regulations require attendance in class. The instructor will use both the scheduled lecture period and the laboratory period to offer

appropriate comments on assignments and to demonstrate useful techniques to accomplish your tasks. You are strongly advised to attend each class period and to work on your assignments during the scheduled laboratory period.

All grades are determined by competency based criteria evaluation. Students are evaluated on individual performances and are not graded in comparison with other students or a normal curve distribution. An “A” grade signifies that a student has achieved both comprehensive mastery of the required work and the minimum performance required for professional level competency as determined by industry standards for entry level technical positions. Regular attendance and active participation are expected and are considered part of the grading process. Students are responsible for class work even if there are legitimate reasons for absence. Faculty initiated withdrawals for non-attendance or disruptive behavior are as per current UAA catalog guidelines.

Class Policies

- Attendance policy - Students are required to attend regularly and participate actively. Students are responsible for class work even if there is a legitimate excuse for their absence.
- Tardiness and leaving early policies - Students will be assessed one (1) point for being late and/or one (1) point for leaving before the end of class.
- Participation - Students are required to attend regularly and participate actively.
- Late work
- Netiquette
- Religious holidays. If a class meeting occurs on a religious holiday or cultural observance day and you are obligated to miss class for this event, you must notify the instructor in writing by the end of the second week of the semester.

University Policies

1. **Attendance** - Students are required to attend regularly and participate actively. Students are responsible for class work even if there is a legitimate excuse for their absence. (See Chapter 7, page 67 of the UAA 2013-2014 Catalog)
2. **Conduct** - Students are expected to exercise self-discipline and appropriate behavior. Conduct which obstructs or disrupts the teaching process will not be tolerated. (See Chapter 5, page 42-43 of the UAA 2013-2014 Catalog)
NOTE: Class participation – There may be new, diverse ideas and perspectives presented during this course. It is my expectation that each person will demonstrate respectful behavior during our class sessions. It is my responsibility to facilitate our class discussions so that each student has an opportunity to participate. Having side conversations with others during class discussions, monopolizing class discussions, failing to yield the floor when requested, failing to follow faculty instructions all detract from the academic environment and the exchange of ideas. Those students who continually engage in these behaviors may be asked to no longer participate in class and may be referred for disciplinary action for alleged UAA Student Code of Conduct violations.
3. **Communication** – UAA uses email to communicate with students on many important matters. The University automatically assigns each student an official email account at the time of admission and registration. Students are responsible for knowing and, when

appropriate, acting on the contents of all university communications sent to their official UAA email account. To receive communication at a different email address, students may forward email from their assigned UAA accounts to any valid third party email address of their choice that accepts forwarded email. (See Chapter 5, page 43 and Chapter 7, page 71 of the UAA 2013-2014 Catalog)

4. **Back-ups** - Students are solely responsible for backing-up any data placed on the UAA S-drive. UAA specifically denies all responsibility and liability for the loss of data placed on the S-drive by students.
5. **Cheating** - Academic integrity is a basic principle which requires that students take credit only for ideas and efforts that are their own. Cheating is not tolerated at UAA and is grounds for dismissal from the University. (See Chapter 5, page 41-43 of the UAA 2013-2014 Catalog) If you have questions regarding academic integrity, there is a tutorial on the Library home page. Suspected cheating will be referred to the Dean of Students Office for review.
6. **Tobacco Use** - Smoking is not permitted inside the building at the University Center. Also, smoking is not permitted within 20 feet of UAA facility entrances (EHS Policy 19). Additionally, tobacco use of any kind is not permitted in the classroom (this includes smokeless tobacco and e-cigarettes).
7. **Right-to-Know Information** - Hazard Communication Program. There are no known chemical hazards in the AET Department.
8. **Student ID Cards** - Students are advised to carry UAA Student ID cards (the Wolf Card) at all times while they are on campus. Your Wolf Card will also be needed to access the CADD Labs (card readers on the east entrances). Cards can be obtained or renewed at the Wolf Card office near the main entrance by taking your current registration paperwork with you.
9. **Personal Safety** - Students should use the buddy system when going in and out of buildings at night. Walk in well-lit areas. The phones in the CADD Labs can be used to reach the Campus Police by dialing 61120.

Support services

1. **Disability support services** - Disability Support Services (DSS) is responsible for coordinating support services for UAA students who experience disabilities. To access support services, students must contact DSS and provide current disability documentation that supports the requested services. Additional information may be accessed at the DSS Office in Rasmuson Hall (RH105) or on-line at www.uaa.alaska.edu/dss.
2. **IT Services Call Center** - Is staffed 7 days per week, 363 days a year. They can assist you with password and PIN reset, software understanding, technical requests, as well as general questions about technology.

Hours of Operation

Monday - Friday 6:00 AM - 12:00 AM

Saturday & Sunday 8:00 AM - 5:00 PM

UAA Holidays 8:00 AM - 5:00 PM

In Anchorage: (907) 786-4646, option 1

Toll Free: (877) 633-3888, option 1

Safety

1. **Online** - UAA will never send you an unsolicited e-mail asking you for your password or other personal information. If you receive such a message, please delete it. If you have any concerns, contact the IT Call Center at (907) 786-4646, menu option 1, or via email at callcenter@uaa.alaska.edu. If you experience cyberbullying, cyberstalking, or other inappropriate conduct as part of your involvement in a UAA class, please notify your instructor immediately.
2. **On campus** - Safety is a priority at UAA. All members of the academic community are encouraged to take responsibility for their own safety by taking the time to locate the nearest exits and emergency telephones when they are in campus buildings. Safety concerns may be brought to the attention of UAA faculty or staff, or the University Police at (907) 786-1120 (V/TTY). For more safety information and the most recent campus crime report, visit www.uaa.alaska.edu/safety.

Bibliography

- Allen, E. (1999). Fundamentals of Building Construction: Materials and Methods (3rd ed.). New York: John Wiley & Sons.
- American Concrete Institute (1994). ACI Detailing Manual – 1994. Publication SP-66 (94). Detroit: Author.
- American Institute of Timber Construction (1999). Manual of Timber Construction (4th ed.) Vancouver, WA: Author.
- American Institute of Steel Construction. (latest). Manual of Steel Construction (9th ed.). Chicago: Author.
- Berg, D.M. and Marks, R. (1997) Structural Technology I. Los Angeles: Architectural License Seminars.
- Construction Specifications Institute. (latest). Manual of Practice. Alexandria, VA: Author
- Construction Specifications Institute. (1999). Uniform Drawing System. Alexandria, VA: Author
- Goetsch, D.L. (1994). Structural Drafting. (2nd ed.). Albany, NY: Delmar
- International Code Council. (2000). International Building Code. Falls Church, VA: Author.
- Jefferis, A. & Smith, K.D. (1997). Commercial Drafting and Detailing. Albany, NY: Delmar
- Kirkpatrick, J. M. (2000). The AutoCAD Book, Drawing, Modeling, and Applications Using AutoCAD 2000. Upper Saddle River, NJ: Prentice-Hall.
- R.S. Means Co. Inc. (latest). Means Illustrated Construction Dictionary. Kingston, MA: Author.
- Spence, W.P. (1998). Construction: Materials, Methods, and Techniques. Albany, NY: Delmar.
- Stellman, T.A. & Krishnan, G.V. (2000). Harnessing AutoCAD 2000. Albany, NY: Autodesk Press.

This work is licensed under the Creative Commons Attribution 3.0 Unported License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/3.0/> or send a letter to Creative Commons, 444 Castro Street, Suite 900, Mountain View, California, 94041, USA.