UNSW Course Outline

ZEIT1501 Engineering Practice and Design - 2024

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General Course Information

Course Code : ZEIT1501
Year : 2024
Term : Semester 2
Teaching Period : Z2
Is a multi-term course? : No
Faculty : UNSW Canberra
Academic Unit : School of Engineering and Technology
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : UNSW Canberra at ADFA
Campus : UNSW Canberra
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This is a foundational course that equips students with the basic concepts of current engineering practice. It is a pre-requisite for the subsequent engineering design courses. It has three elements: a lecture series, computer-aided design (CAD) and manufacturing (CAM)

practicals using 3DExperience and workshop practicals using the CNC mills. In the lecture series, students are introduced to the following: systems engineering approach to complex engineering problems, the main manufacturing processes and the fundamentals of fastenings, cutting tools and mechanical assemblies (fits, limits and tolerances).

Course Aims

The lectures and directed at-home study introduce students to three aspects of engineering practice:

· The systems engineering approach to the development of an engineered product. Systems engineering is a robust, systematic way of dealing with the engineering problems that students will face throughout their studies and later career.
· The main methods of product manufacturing. This provides a broad understanding of the application and the pros and cons of each method. Students are required to view a set of manufacturing videos during at-home study.
· A number of mechanical engineering fundamentals, namely, fastening methods, cutting tool theory and the assembly of mechanical parts (fits, limits and tolerances).

The hands-on practice covers computer-aided design (CAD) and computer-aided manufacturing (CAM) as follows:

· CAD and CAM are taught in five self-directed sessions each of 3 hours duration. This gives students competency in the 3DEXPERIENCE assemblies and drafting and introduces the CAM package as required for later courses.

Relationship to Other Courses

The course builds on the scientific and technological basis of the Year 1 prerequisite course in Introduction to Mechanical, Aeronautical and Naval Architecture Engineering (ZEIT1504) and is a foundational course in engineering practice and design. These two courses then provide the foundation for the sequence of subsequent design courses beginning with ZEIT2501, which engages students in the International “Warman Design and Build Competition”.

Course Learning Outcomes

Course Learning Outcomes	Engineers Australia - Professional Engineer (Stage 1)
CLO1 : On successful completion of this program, the graduates will be able to explain the principles of the systems engineering approach to an engineering problem.	• PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.1 : Ethical conduct and professional accountability • PEE3.2 : Effective oral and written communication in professional and lay domains
CLO2 : On successful completion of this program, graduates will be able to describe the main manufacturing methods including their application, advantages and disadvantages.	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE3.2 : Effective oral and written communication in professional and lay domains
CLO3 : On successful completion of this program, graduates will be able to describe the main fastening methods and the key principles.	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE3.2 : Effective oral and written communication in professional and lay

	domains
CLO4 : On successful completion of this program, graduates will be able to describe the theory of cutting tools.	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE3.2 : Effective oral and written communication in professional and lay domains
CLO5 : On successful completion of this program, graduates will be able to apply the theory of fits, limits and tolerances to the design of a simple mechanical assembly.	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.1 : Ethical conduct and professional accountability • PEE3.2 : Effective oral and written communication in professional and lay domains
CLO6 : On successful completion of this program, graduates will be able to apply the theory of limits, fits and tolerances, and cutting tool theory to produce a simple mechanical assembly.	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes

	• PEE3.1 : Ethical conduct and professional accountability • PEE3.2 : Effective oral and written communication in professional and lay domains
CLO7 : On successful completion of this program, graduates will be able to produce computer-aided design (CAD) and manufacture (CAM) models of mechanical components and assemblies using the 3dExperience software package.	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes

Course Learning Outcomes	Assessment Item
CLO1 : On successful completion of this program, the graduates will be able to explain the principles of the systems engineering approach to an engineering problem.	• Tutorials • Requirements Report • Final Report and Validation
CLO2 : On successful completion of this program, graduates will be able to describe the main manufacturing methods including their application, advantages and disadvantages.	• Final Examination • Tutorials • Final Report and Validation
CLO3 : On successful completion of this program, graduates will be able to describe the main fastening methods and the key principles.	• Tutorials • Final Report and Validation
CLO4 : On successful completion of this program, graduates will be able to describe the theory of cutting tools.	• Tutorials • Final Report and Validation
CLO5 : On successful completion of this program, graduates will be able to apply the theory of fits, limits and tolerances to the design of a simple mechanical assembly.	• Drawings/Tolerances/CAD Assembly • Tutorials • Final Report and Validation
CLO6 : On successful completion of this program, graduates will be able to apply the theory of limits, fits and tolerances, and cutting tool theory to produce a simple mechanical assembly.	• CNC workshop • Drawings/Tolerances/CAD Assembly • Tutorials • Final Report and Validation
CLO7 : On successful completion of this program, graduates will be able to produce computer-aided design (CAD) and manufacture (CAM) models of mechanical components and assemblies using the 3dExperience software package.	• CAM • Drawings/Tolerances/CAD Assembly • Final Report and Validation

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate

Learning and Teaching in this course

The Learning Management System

Moodle is the Learning Management System used at UNSW Canberra. All courses have a Moodle site which will become available to students at least one week before the start of semester. Please find all help and documentation (including Blackboard Collaborate) at the Moodle Support page.

UNSW Moodle supports the following web browsers:

» Google Chrome 50+
» Safari 10+
** Internet Explorer is not recommended

** Addons and Toolbars can affect any browser's performance.

Operating systems recommended are:

Windows 7, 10, Mac OSX Sierra, iPad IOS10

For further details about system requirements click here.

Log in to Moodle here.

If you need further assistance with Moodle:

For enrolment and login issues please contact:
IT Service Centre
Email: itservicecentre@unsw.edu.au
Phone: (02) 9385-1333
International: +61 2 9385 1333

For all other Moodle issues please contact:
External TELT Support
Email: externalteltsupport@unsw.edu.au
Phone: (02) 9385-3331
International: +61 2 938 53331

Opening hours:
Monday – Friday 7:30am – 9:30 pm
Saturday & Sunday 8:30 am – 4:30pm

Other Professional Outcomes

Developing Graduate Capabilities

Successful completion of this course contributes to the acquisition of UNSW graduate capabilities. UNSW aspires to develop globally focused graduates who are ***rigorous scholars***, capable of ***leadership*** and ***professional practice*** in an ***international*** community.

Students will be encouraged to develop the following Program-level learning outcomes by undertaking the course activities and mastering the knowledge content. These outcomes are based on the Engineers Australia Stage 1 Competencies for Professional Engineers and will be assessed within the assessment tasks:

1.1 (Knowledge and Skill Base) Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.

1.2 (Knowledge and Skill Base) Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.

1.5 (Knowledge and Skill Base) Knowledge of engineering design practice and contextual factors impacting the engineering discipline.

2.2 (Engineering Application Ability) Fluent application of engineering techniques, tools and resources.

2.3 (Engineering Application Ability) Application of systematic engineering synthesis and design processes.

3.2 (Professional and Personal Attributes) Effective oral and written communication in professional and lay domains.

Additional Course Information

Academic Integrity and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. All students are expected to adhere to UNSW's Student Code of Conduct https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf

Plagiarism undermines academic integrity and is not tolerated at UNSW. It is defined as using the words or ideas of others and passing them off as your own, and can take many forms, from deliberate cheating to accidental copying from a source without acknowledgement.

For more information, please refer to the following: https://student.unsw.edu.au/plagiarism

Referencing

In this course, students are required to reference following the APA 7 / Chicago NB referencing style. Information about referencing styles is available at: https://guides.lib.unsw.adfa.edu.au/c.php?g=472948&p=3246720

Study at UNSW Canberra

https://www.unsw.adfa.edu.au/study

Study at UNSW Canberra has lots of useful information regarding:

- Where to get help
- Administrative matters
- Getting your passwords set up
- How to log on to Moodle
- Accessing the Library and other areas.

Additional Information as required

CRICOS Provider no. 00098G
The University of New South Wales Canberra.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates	Engineers Australia - Professional Engineer (Stage 1)
Tutorials Assessment Format: Individual	10%	Start Date: During Tutorial Due Date: During Tutorial	• PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE3.1 : Ethical conduct and professional accountability
Requirements Report Assessment Format: Individual	10%	Start Date: 17/07/2024 10:00 AM Due Date: 31/07/2024 11:59 PM	• PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.2 : Effective oral and written communication in professional and lay domains • PEE3.1 : Ethical conduct and professional accountability
Drawings/Tolerances/	20%	Start Date: Not Applicable	• PEE1.2 : Conceptual

CAD Assembly Assessment Format: Individual		Due Date: 21/08/2024 11:55 PM	understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE3.2 : Effective oral and written communication in professional and lay domains
CAM Assessment Format: Individual	0%	Start Date: Not Applicable Due Date: Week 7: 09 September - 13 September	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE2.2 : Fluent application of engineering techniques, tools and resources
CNC workshop Assessment Format: Individual	0%	Start Date: During the CNC workshop session, after the CAM assessment is satisfactorily completed Due Date: During the CNC workshop session; you must complete before 17:00, 11th October 2024	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE2.1 : Application of established engineering methods to complex

			engineering problem solving
Final Report and Validation Assessment Format: Individual	30%	Start Date: Not Applicable Due Date: Final Report is due: 18/10/2024 11:55 PM; Validation Testing is TBC (wk13)	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE1.5 : Knowledge of engineering design practice and contextual factors impacting the engineering discipline • PEE1.6 : Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline • PEE2.2 : Fluent application of engineering techniques, tools and resources • PEE2.3 : Application of systematic engineering synthesis and design processes • PEE3.2 : Effective oral and written communication in professional and lay domains • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE3.1 : Ethical conduct and professional accountability
Final Examination Assessment Format: Individual	30%	Start Date: Exam period Due Date: Exam period; 2 hours after the opening of the exam	• PEE1.2 : Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline • PEE2.1 : Application of established engineering methods to complex engineering problem solving • PEE3.2 : Effective oral and

			written communication in professional and lay domains

Assessment Details

Tutorials

Assessment Overview

The tutorial work will be assessed. Each tutorial features a short task to be done during the tutorial (for example, answering a quiz question on Moodle).

Course Learning Outcomes

- CLO1 : On successful completion of this program, the graduates will be able to explain the principles of the systems engineering approach to an engineering problem.
- CLO2 : On successful completion of this program, graduates will be able to describe the main manufacturing methods including their application, advantages and disadvantages.
- CLO3 : On successful completion of this program, graduates will be able to describe the main fastening methods and the key principles.
- CLO4 : On successful completion of this program, graduates will be able to describe the theory of cutting tools.
- CLO5 : On successful completion of this program, graduates will be able to apply the theory of fits, limits and tolerances to the design of a simple mechanical assembly.
- CLO6 : On successful completion of this program, graduates will be able to apply the theory of limits, fits and tolerances, and cutting tool theory to produce a simple mechanical assembly.

Detailed Assessment Description

Students' in-class participation in the tutorial sessions will be assessed by the lecturer. Each tutorial features one short task to be done during the tutorial (for example, answering a quiz question on Moodle). The tasks are designed to encourage active participation in the tutorials and the application of the concepts learned. The course has 7 tutorials covering systems engineering, fasteners, tolerances, and different aspects of manufacturing. Thus, there will be 7 short tasks, all of equal weight. The total weight of tutorials is 10%.

Assessment Length

Short Answer Questions

Assignment submission Turnitin type

Not Applicable

Requirements Report

Assessment Overview

This assessment item forms part of the large Manufacturing Assignment that runs throughout the course: **item 1**. For the Manufacturing Assignment students are expected to work in pairs to design and manufacture two machined components. Each student will be responsible for the delivery of a single component and design.

The aim of this submission is to define the requirements for the part that you will manufacture during the Manufacturing Assignment.

Course Learning Outcomes

- CLO1 : On successful completion of this program, the graduates will be able to explain the principles of the systems engineering approach to an engineering problem.

Detailed Assessment Description

Requirements Report

Aim. The aim of this submission is to define the requirements for the part that you will manufacture during the Manufacturing Assignment. This should include the clearly stated requirements taken from this assignment sheet and methods for verification and validation of the requirements.

Description. You will submit an assignment of no more than 4 pages outlining the requirements for the part that you manufacture. You will find a template for the submission on the Moodle site for the course. Your assignment must include the Functional Requirements for your part and the Risk Assessment.

Assessment Criteria. Your assignment will be assessed using the following criteria (a complete rubric can be found on the Moodle page):

- Professionalism of the report (appropriate layout, grammar, spelling and clarity)
- Understanding of Systems Engineering as covered in the lectures:
  - clear and appropriate definition of requirements,
  - completeness of requirements identified,
  - effectiveness of verification methods,
  - clear and appropriate definition of risks,
  - clear and appropriate definition of assumptions.

Assessment Length

no more than 4 pages

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Drawings/Tolerances/CAD Assembly

Assessment Overview

This assessment item forms part of the large Manufacturing Assignment that runs throughout the course: **item 2**.

The aim of this submission is to provide a student's design for one of the supporting members that the student will make in the CNC machine, along with the entire CAD assembly.

Course Learning Outcomes

- CLO5 : On successful completion of this program, graduates will be able to apply the theory of fits, limits and tolerances to the design of a simple mechanical assembly.
- CLO6 : On successful completion of this program, graduates will be able to apply the theory of limits, fits and tolerances, and cutting tool theory to produce a simple mechanical assembly.
- CLO7 : On successful completion of this program, graduates will be able to produce computer-aided design (CAD) and manufacture (CAM) models of mechanical components and assemblies using the 3dExperience software package.

Detailed Assessment Description

Drawings/Tolerances/CAD Assembly

Aim. The aim of this submission is to provide your design for one of the supporting members that you will make in the CNC machine, along with the entire CAD assembly. This first component includes manufacturing drawings of the part that you will make in the CNC machine and justifications for the tolerances and fasteners. The drawings must include all relevant views and dimensions required to fully define the part and should follow Australian Standard AS 1100. Appropriate tolerances must be included for all dimensions on the drawing. The CAD assembly should include two supporting members, fasteners, and the testing setup. The drawings and the CAD assembly should be created using the 3DExperience software.

Description. In this submission, you will submit your design for one of the supporting members to be made in the CNC machine and the entire CAD assembly. A template for the report will be

released on the Moodle site. You should reflect on the requirements that you specified in the first submission (also review the feedback). The submission needs to include the following things:

- A drawing of your part to be manufactured in the CNC machine (this must include all dimensions and tolerances required to manufacture your part)
- The interface drawing defining the interface between your part and your partner's part (this should be the same as your partner's drawing, please indicate your partner's zID number on the drawing)
- A short document addressing the following (template will be provided):
  - justification of the tolerances specified on the drawing,
  - justification of the size and number of fasteners used,
  - any calculations performed to support the above justifications.
- The CAD assembly including two supporting members, fasteners, and the testing setup.

Assessment Criteria. Your assignment will be assessed using the following criteria (a complete rubric can be found on the Moodle page):

- Quality of drawings (appropriate layout, conformance with Australian Standard AS1100, completeness of information provided);
- Dimensions (part is fully dimensioned, all critical dimensions provided on drawing, no over dimensioning of drawing unless indicated);
- Tolerances (appropriately noted on the drawing, all tolerances justified, and tolerances are achievable and necessary);
- Appropriate choice of fasteners (fasteners are appropriately selected based on calculation);
- Interface definition (interface definition is sufficient and appropriate).
- Quality of the CAD assembly (assembly contains all required parts and is properly constrained, sketches for each individual part are properly constrained, features are correct and present, no general issues). In the CAD assembly assessment component, each student is responsible for their individual design; for the other part of the CAD assembly work, students can indicate each group member's contribution to the work (in % terms). However, if this information is absent, it will be assumed that each member contributed equally.

Assessment Length

3 pages + Drawings + CAD assembly

Submission notes

Report (Turnitin submission) and CAD assembly file submitted through Moodle course site. Drawings are to be submitted within the report structure but could also be submitted as a separate file for better quality.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

CAM

Assessment Overview

This assessment item forms part of the large Manufacturing Assignment that runs throughout the course: **item 3**.

The computer-aided manufacturing (CAM) component of the course will provide engineering students with basic CAM competencies that will be called upon in future courses. This component is of key importance for the CNC workshop assessment item. This assignment will be your demonstration of the ability to produce a CAM program to run in the CNC machines in the student workshop.

Students must satisfactorily complete this activity to pass the course.

Course Learning Outcomes

- CLO7 : On successful completion of this program, graduates will be able to produce computer-aided design (CAD) and manufacture (CAM) models of mechanical components and assemblies using the 3dExperience software package.

Detailed Assessment Description

CAM

Aim. This assignment will be your demonstration of the ability to produce a CAM program using the 3DEXPERIENCE software to run in the CNC machines in the student workshop.

Description. For this assignment you are required to demonstrate your ability to generate a CAM program to manufacture the part that you designed for the assignment above (Note: you can change your part submitted in tolerancing and drawing report and you may be encouraged to do so based on the feedback you receive).

During the last CAM practice session (according to the group), you should show your Assignment part design and CAM program developed using 3DEXPERIENCE. Your CAM program should be relevant to make the part, can achieve tolerances and critical parameters and should not create issues for the CNC machine/tools such as potential tool damage etc.

Assessment Criteria. Your assignment will be assessed using the following criteria (pass/fail):

- Ability of the program to make the part with no issues for the CNC machine/tools;
- Tolerances and critical parameters can be achieved with the program
- Optimized cutter path to minimize machining time and reduce tool changes

Assessment Length

3DExperience CAM program

Submission notes

3DExperience CAM program to be checked by the course team member during the last CAM practice session

Assignment submission Turnitin type

Not Applicable

CNC workshop

Assessment Overview

This assessment item forms part of the large Manufacturing Assignment that runs throughout the course: **item 4**.

The workshop practice component of the course will provide engineering students with basic CNC mill competencies that will be called upon in future courses. This assignment will be your demonstration of the ability to produce a part using the CNC machine in the student workshop.

Students must satisfactorily complete this activity to pass the course.

Course Learning Outcomes

- CLO6 : On successful completion of this program, graduates will be able to apply the theory of limits, fits and tolerances, and cutting tool theory to produce a simple mechanical assembly.

Detailed Assessment Description

CNC workshop

Aim. This assignment will be the demonstration of your competency using the CNC machines in the student workshop.

Description. As a prerequisite for this assignment, your 3DExperience CAM program to run the CNC machine should have been checked by the course team within the previous assessment item CAM. If you have not satisfactorily completed the CAM assessment, you will not be admitted to the CNC workshop practice element.

When you attend the CNC workshop session, you shall provide your CAM program, which should have been discussed with the course team and TSG staff during the last CAM practice session,

as indicated above. Therefore, each student will have a slightly different due date, depending on their timetabled CNC workshop slot, but the workshop practice element needs to occur before the due date stated above (unless an extension is granted). You should demonstrate your competency using the CNC machines.

It is not required that you manufacture the final part in this first session, and it is expected that some students will require more than one session to complete the manufacture of their component.

Assessment Criteria. Your assignment will be assessed using the following criteria (pass/fail):

- Competency on the CNC machine.

Assessment Length

Competency Demonstration

Assignment submission Turnitin type

Not Applicable

Final Report and Validation

Assessment Overview

This assessment item forms part of the large Manufacturing Assignment that runs throughout the course: **item 5**.

This assignment will capture the summary of the work that you have done as part of the assignment. All submissions will be assessed individually; however the demonstration of your part will need to be conducted with your partner.

Course Learning Outcomes

- CLO1 : On successful completion of this program, the graduates will be able to explain the principles of the systems engineering approach to an engineering problem.
- CLO2 : On successful completion of this program, graduates will be able to describe the main manufacturing methods including their application, advantages and disadvantages.
- CLO3 : On successful completion of this program, graduates will be able to describe the main fastening methods and the key principles.
- CLO4 : On successful completion of this program, graduates will be able to describe the theory of cutting tools.
- CLO5 : On successful completion of this program, graduates will be able to apply the theory of fits, limits and tolerances to the design of a simple mechanical assembly.
- CLO6 : On successful completion of this program, graduates will be able to apply the theory of limits, fits and tolerances, and cutting tool theory to produce a simple mechanical

assembly.
- CLO7 : On successful completion of this program, graduates will be able to produce computer-aided design (CAD) and manufacture (CAM) models of mechanical components and assemblies using the 3dExperience software package.

Detailed Assessment Description

Final Report and Validation

Aim. This assignment will capture the summary of the work that you have done as part of the assignment. All submissions will be assessed individually; however the demonstration of your part will need to be conducted with your partner.

Description. The report should capture the final information associated with your manufactured components. A report template will be provided on the Moodle site. The assignment should include:

- the final drawings of the as-built part,
- the final requirements for the design,
- the test and validation matrix, including the outcomes of any testing conducted.
- a discussion on the success of your design and a reflection on improvements that could be made to the approach.

The validation should demonstrate the outcome of hands-on application of the knowledge of design, tolerancing and fasteners and is intended to evaluate whether the component you produced is fulfilling the requirements outlined in Section 2 of the Manufacturing Assignment description (the file can be found on Moodle).

Assessment Criteria. Your assignment will be assessed using the following criteria (a complete rubric can be found on the Moodle page):

- Quality of drawings,
- Completeness and quality of the final requirements,
- Completeness of the test and validation matrix, and
- Quality of the insights from the reflection on the design presented.
- Functionality of the parts:
  - Ability to assemble the parts together and to the defined interfaces,
  - Alignment of the defined reference point to better than ±1mm X, Y and Z, and
  - Ability to support 10kg of load at the reference point.

Assessment Length

6-page report plus drawings plus demonstration of the parts

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Final Examination

Assessment Overview

n/a

Course Learning Outcomes

- CLO2 : On successful completion of this program, graduates will be able to describe the main manufacturing methods including their application, advantages and disadvantages.

Detailed Assessment Description

The final exam will be scheduled during the exam period.

Duration: 2 hours after the opening of the exam.

Mode: Open book

The final exam is designed to assess your understanding and application of the key concepts covered throughout the course. The exam will consist of a combination of essay-type questions and problem-solving questions, aimed at evaluating your critical thinking, analytical skills, and ability to apply theoretical knowledge to practical scenarios.

Assessment Length

essay-type questions and problem-solving questions

Assignment submission Turnitin type

Not Applicable

General Assessment Information

Assessment Requirements

This course will be assessed by the tests and assignments summarised above. The assignments that require CAD/CAM software usage should be done using 3DExperience. The assessment dates for the CAM assessment and CNC workshop depend on each student's group. The CAM assessment must be passed before the CNC workshop practice element. Otherwise, students will not be admitted to the CNC workshop practice element.

Individual assignments are to be an individual's own independent work. Students MUST declare

originality (e.g. by signing a coversheet for paper-based submission or including an attesting statement in electronic submissions). Plagiarism is not tolerated. All materials submitted must be legible and logical in presentation. Marks will reflect an assessment of these characteristics.

Late Submission of Assessment

Unless a formal application for special consideration is submitted, a penalty of 5% of the total available mark for the assessment will apply for each day that an assessment item is late up to a maximum of 5 days (120 hours) after which an assessment can no longer be submitted and a grade of 0 will be applied. All requests for special consideration must be formally submitted via the Special Consideration online service.

Use of Generative AI in Assessments

For the assessment tasks, you may use standard editing and referencing software (e.g. Microsoft Office suite), but not Generative AI. If the use of generative AI such as ChatGPT is detected, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

Individual Written Feedback on Assessment Tasks before the Census Date

Requirements report will be due in week 3. Written feedback and grades will be given to students before the census date (11 August).

Grading Basis

Standard

Requirements to pass course

The overall passing mark is set at 50% by the University. In addtion, passing the competency assessments (CAM and CNC workshop practice elements) is required to pass the course.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 15 July - 19 July	Lecture	• Thursday 1000 – 1100, Course Intro – Zinovieva, Doolan • Friday 1100 – 1200, Systems Engineering – Doolan
Week 2 : 22 July - 26 July	Lecture	• Thursday 1000 – 1100, Systems Engineering – Doolan • Friday 1100 – 1200, Systems Engineering – Doolan
	Tutorial	Systems Engineering tutorials (Doolan) are scheduled for this week. Refer to your timetable for specific times (one of the four sessions below). • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday 1200 – 1300 • Friday 1400 – 1500 Refer to the course schedule on Moodle for up-to date details.
Week 3 : 29 July - 2 August	Lecture	• Thursday 1000 – 1100, CAD – Zinovieva • Friday 1100 – 1200, Fasteners – Doolan
	Tut-Lab	CAD practical sessions (Zinovieva) start this week. Refer to your timetable for specific times (one of the four sessions below). • Monday 1500 – 1800 • Wednesday 1500 – 1800 • Thursday 1500 – 1800 • Friday 1500 – 1800 Refer to the course schedule on Moodle for up-to date details.
	Assessment	Requirements Report (10%) is due 31 JUL 11:59 PM
Week 4 : 5 August - 9 August	Lecture	• Thursday 1000 – 1100, Fasteners – Doolan • Friday 1100 – 1200, Tolerances – Doolan
	Tut-Lab	CAD practical sessions (Zinovieva) continue this week. Refer to your timetable for specific times (one of the four sessions below). • Monday 1500 – 1800 • Wednesday 1500 – 1800 • Thursday 1500 – 1800 • Friday 1500 – 1800 Refer to the course schedule on Moodle for up-to date details.
	Tutorial	Fasteners tutorials (Doolan) are scheduled for this week. Refer to your timetable for specific times (one of the four sessions below). • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday 1200 – 1300 • Friday 1400 – 1500 Refer to the course schedule on Moodle for up-to date details.
Week 5 : 12 August - 16 August	Lecture	Tuesday, Aug 13: Friday Timetable • Tuesday 1100 – 1200, Tolerances – Doolan • Thursday 1000 – 1100, Introduction to Manufacturing – Zinovieva • Friday – OFF, Military Training Day
	Tut-Lab	CAM practical sessions (Zinovieva) start this week. Refer to your timetable for specific times (one of the four sessions below). For the part of your CAM practical session, you will have a general induction to CNC (Bailey). Tuesday, Aug 13: Friday Timetable • Monday 1500 – 1800 • Tuesday 1500 – 1800 • Wednesday 1500 – 1800 • Thursday 1500 – 1800 • Friday – OFF, Military Training Day Refer to the course schedule on Moodle for up-to date details.
	Tutorial	Tolerances tutorials (Doolan) are scheduled for this week. Refer to your timetable for specific times (one of the four sessions below). Tuesday, Aug 13: Friday Timetable • Tuesday 1400 – 1500 • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday 1200 – 1300 • Friday – OFF, Military Training Day Refer to the course schedule on Moodle for up-to date details.
Week 6 : 19 August - 23 August	Lecture	• Thursday 1000 – 1100, Manufacturing – Zinovieva • Friday 1100 – 1200, Manufacturing – Zinovieva
	Tut-Lab	CAM practical sessions (Zinovieva) continue this week. Refer to your timetable for specific times (one of the four sessions below).

		• Monday 1500 – 1800 • Wednesday 1500 – 1800 • Thursday 1500 – 1800 • Friday 1500 – 1800 Refer to the course schedule on Moodle for up-to date details.
	Assessment	Drawings/Tolerances/CAD Assembly (20%) is due Aug 21
Week 7 : 9 September - 13 September	Tut-Lab	CAM practical sessions (Zinovieva) continue this week. Refer to your timetable for specific times (one of the four sessions below). Note that you have the CAM assessment during your CAM sessions. • Monday 1500 – 1800 • Wednesday 1500 – 1800 • Thursday 1500 – 1800 • Friday 1500 – 1800 Refer to the course schedule on Moodle for up-to date details.
	Tutorial	Manufacturing tutorials (Zinovieva) are scheduled for this week. Refer to your timetable for specific times (one of the four sessions below). • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday 1200 – 1300 • Friday 1400 – 1500 Refer to the course schedule on Moodle for up-to date details.
	Workshop	CNC workshop practical sessions (Bailey) start this week. Refer to your timetable for specific times. As a prerequisite for the CNC workshop, you should attend a general induction session (scheduled during Wk5 as part of your CAM practice session) and have your 3DExperience CAM program to run the CNC machine checked by the course team within the assessment item CAM (this should be done at the last CAM practice session; the day depends on each student's group). The workshop session includes 1 hr of detailed induction and 1 hr of machining for your part. These 1-hour sessions may be timetabled as a single 2-hour session or as two separate 1-hour sessions (please refer to your timetable). To get a 'pass' for the CNC workshop assessment, you need to satisfactorily complete 2 hrs of the CNC workshop, i.e. 1 hr of detailed induction and 1 hr scheduled for your part manufacturing.
	Assessment	CAM (0%, pass/fail) is due Wk7, according to your CAM group session. Students must satisfactorily complete this activity to pass the course.
Week 8 : 16 September - 20 September	Lecture	• Thursday 1000 – 1100, Manufacturing – Doolan • Friday 1100 – 1200, Manufacturing – Doolan
	Workshop	CNC workshop practical sessions (Bailey) continue this week. Refer to your timetable for specific times. As a prerequisite for the CNC workshop, you should attend a general induction session (scheduled during Wk5 as part of your CAM practice session) and have your 3DExperience CAM program to run the CNC machine checked by the course team within the assessment item CAM (this should be done at the last CAM practice session; the day depends on each student's group). The workshop session includes 1 hr of detailed induction and 1 hr of machining for your part. These 1-hour sessions may be timetabled as a single 2-hour session or as two separate 1-hour sessions (please refer to your timetable). To get a 'pass' for the CNC workshop assessment, you need to satisfactorily complete 2 hrs of the CNC workshop, i.e. 1 hr of detailed induction and 1 hr scheduled for your part manufacturing.
Week 9 : 23 September - 27 September	Lecture	• Thursday 1000 – 1100, Manufacturing – Doolan • Friday 1100 – 1200, Manufacturing – Doolan
	Tutorial	Manufacturing tutorials (Doolan) are scheduled for this week. Refer to your timetable for specific times (one of the four sessions below). • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday 1200 – 1300 • Friday 1400 – 1500 Refer to the course schedule on Moodle for up-to date details.
	Workshop	CNC workshop practical sessions (Bailey) continue this week. Refer to your timetable for specific times. As a prerequisite for the CNC workshop, you should attend a general induction session (scheduled during Wk5 as part of your CAM practice session) and have your 3DExperience CAM program to run the CNC machine checked by the course team within the assessment item CAM (this should be done at the last CAM practice session; the day depends on each student's group). The workshop session includes 1 hr of detailed induction and 1 hr of machining for your part. These 1-hour sessions may be timetabled as a single 2-hour session or as two separate 1-hour sessions (please refer to

		your timetable). To get a 'pass' for the CNC workshop assessment, you need to satisfactorily complete 2 hrs of the CNC workshop, i.e. 1 hr of detailed induction and 1 hr scheduled for your part manufacturing.
Week 10 : 30 September - 4 October	Lecture	• Thursday 1000 – 1100, Manufacturing – Doolan • Friday 1100 – 1200, Manufacturing – Doolan
	Tutorial	Manufacturing tutorials (Doolan) are scheduled for this week. Refer to your timetable for specific times (one of the four sessions below). • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday 1200 – 1300 • Friday 1400 – 1500 Refer to the course schedule on Moodle for up-to date details.
	Workshop	CNC workshop practical sessions (Bailey) continue this week. Refer to your timetable for specific times. As a prerequisite for the CNC workshop, you should attend a general induction session (scheduled during Wk5 as part of your CAM practice session) and have your 3DExperience CAM program to run the CNC machine checked by the course team within the assessment item CAM (this should be done at the last CAM practice session; the day depends on each student's group). The workshop session includes 1 hr of detailed induction and 1 hr of machining for your part. These 1-hour sessions may be timetabled as a single 2-hour session or as two separate 1-hour sessions (please refer to your timetable). To get a 'pass' for the CNC workshop assessment, you need to satisfactorily complete 2 hrs of the CNC workshop, i.e. 1 hr of detailed induction and 1 hr scheduled for your part manufacturing.
Week 11 : 7 October - 11 October	Lecture	• Thursday – OFF, Military Training Day • Friday – OFF, Military Training Day
	Tutorial	Manufacturing tutorials (Doolan) are scheduled for this week. Refer to your timetable for specific times (one of the two sessions below). • Wednesday 1200 – 1300 • Wednesday 1300 – 1400 • Thursday – OFF, Military Training Day • Friday – OFF, Military Training Day Refer to the course schedule on Moodle for up-to date details.
	Workshop	CNC workshop practical sessions (Bailey) continue this week. Refer to your timetable for specific times. As a prerequisite for the CNC workshop, you should attend a general induction session (scheduled during Wk5 as part of your CAM practice session) and have your 3DExperience CAM program to run the CNC machine checked by the course team within the assessment item CAM (this should be done at the last CAM practice session; the day depends on each student's group). The workshop session includes 1 hr of detailed induction and 1 hr of machining for your part. These 1-hour sessions may be timetabled as a single 2-hour session or as two separate 1-hour sessions (please refer to your timetable). To get a 'pass' for the CNC workshop assessment, you need to satisfactorily complete 2 hrs of the CNC workshop, i.e. 1 hr of detailed induction and 1 hr scheduled for your part manufacturing.
	Assessment	CNC workshop practice assessment (0%, pass/fail) must be completed before 1700, October 11.
Week 12 : 14 October - 18 October	Lecture	• Thursday – Manufacturing – Doolan • Friday – Manufacturing – Zinovieva
	Tutorial	Manufacturing tutorials (Doolan) are scheduled for this week to catch up for the previous week. Refer to your timetable for specific times (one of the two sessions below). • Thursday 1200 – 1300 • Friday 1400 – 1500 Note that there will be no Wed tutes this week. Refer to the course schedule on Moodle for up-to date details.
	Assessment	Final Report (30%) is due Oct 18
Week 13 : 21 October - 25 October	Lecture	• Thursday – Course Summary – Zinovieva
	Assessment	Validation Testing (part of the Final Report and Validation assessment item) is due this week. Demonstration Sessions:TBC.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

Generally, there are two lectures per week each of 1 hour duration. All students attend these lectures.
Additionally, students are allocated into groups to rotate through the practical CAD, CAM, workshop and tutorial sessions. Each group has one CAD/CAM practical session each week, of 3 hours duration, and one tutorial each week, of 1 hour each. Each student has a general induction to CNC (in groups) and 2 hrs CNC workshop.
Preparatory work for the lectures and the practical sessions is discussed in class and detailed on the Moodle website. Students are required to complete this work before the relevant session.

Course Resources

Prescribed Resources

Lecture notes, lecture recordings and other relevant materials will be available through Moodle. It is recommended that students spend some time engaging with engineering literature in the library.

Testing setup and standard fasteners for the Manufacturing assignment will be available in the workshop areas. Pre-cut aluminium plates will be provided. CNC mills will be available in the student workshop areas in accordance with the School policies and procedures.

Compulsory Materials

The following resources are compulsory for this course

- Grover M.P. (2020). Fundamentals of Modern Manufacturing 7th Ed. Wiley (ISBN 9781119128691)
- Culley, R. (2010). *Fitting and Machining* Single Volume Ed. (ISBN 9781921426780)
- 3DExperience, the latest version, each student should have their own licence for this software available from ZEIT1504. Otherwise, please request the licence from the course convenor. 3DExperience will be used for both CAD and CAM within this course.

Recommended Resources

Recommended Readings

- Australian Technical Drawing Standard: AS1100, this is available through the university library

site.

Additional Costs

n/a

Course Evaluation and Development

One of the key priorities in the 2025 Strategy for UNSW is a drive for academic excellence in education. One of the ways of determining how well UNSW is progressing towards this goal is by listening to our own students. Students will be asked to complete the myExperience survey towards the end of this course.

Students can also provide feedback during the semester via: direct contact with the lecturer, the "On-going Student Feedback" link in Moodle, Student-Staff Liaison Committee meetings in schools, informal feedback conducted by staff, and focus groups. Student opinions really do make a difference. Refer to the Moodle site for this course to see how the feedback from previous students has contributed to the course development.

Important note: Students are reminded that any feedback provided should be constructive and professional and that they are bound by the Student Code of Conduct Policy https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Olga Zinovieva		Building 17, Room 129	VOIP: 5114 5177; via Teams	Usually available for Teams or face-to-face consultation during normal working hours. Contact via Teams or email to make an appointment.	No	Yes
Lecturer	Matthew Doolan		Building 17, Room 209	VOIP: 5114 5176; via Teams	Usually available for Teams or face-to-face consultation during normal working hours. Contact via Teams or email to make an appointment.	No	No
Lab supervisor	Lis Bailey		Student Workshop Manager; student workshop	via Teams	Usually available for Teams or face-to-face consultation during normal working hours. Contact via Teams or email to make an appointment.	No	No