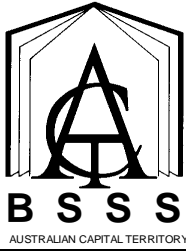


ANU SECONDARY COLLEGE



DISCOVERING ENGINEERING ANU

H COURSE



H Course

University: Australian National University

Course Title: Discovering Engineering ANU

Classification: H

Course Code

Unit Title(s)	Value (1.0)	Length	Unit Codes
Discovering Engineering ANU 1	1.0	S	
Discovering Engineering ANU 2	1.0	S	

Dates of Course Recognition: From To

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Course Name

Discovering Engineering ANU

Course Classification

H

Course Developers

Name	Qualifications
Jeremy Smith	BE (Hons), BIT, MPhil, Grad Cert (Teaching and Learning in Higher Education)

This group gratefully acknowledges the contributions of John K See.

Course Length and Composition

Name and Number of Units Submitted and the Length of the Units expressed as a Value

Unit Title	Unit Value
Discovering Engineering ANU 1	1.0
Discovering Engineering ANU 2	1.0

Available Course Patterns

Course	Minimum number of hours per course	Number of standard 1.0 value units to meet course requirements
Minor	110 hours	2 units of 55 hours

Implementation Guidelines

Duplication of content

This course is deemed to have significant duplication of content with the *CAD and 3D Animation A/T Type 2* course and the *Design and Graphics A/T Type 2* course. Students studying units in *CAD and 3D Animation A/T Type 2* course and the *Design and Graphics A/T Type 2* course in their home college cannot count units in this Discovering Engineering ANU H course towards the requirements for an ACT Year 12 Certificate and Tertiary Entrance Statement (ATAR).

Prerequisites or co requisites home college course

Students who take this course should be enrolled in Specialist Mathematics at their home college. If a student is enrolled in Mathematics Methods their enrolment in this course will be dependent on a recommendation from their college and a consideration of other courses in which they are enrolled.

Contribution towards an ATAR

Students can count up to two H courses to a maximum weight of 1.2 (equivalent to 2 minors) out of the required 3.6 in the calculation of the ATAR.

A maximum of 4 standard units from H courses can contribute to the minimum requirements for a Year 12 Certificate and Tertiary Entrance Statement.

Reporting of H courses on the ACT Year 12 certificate

Home college and H courses are reported separately, each with its own course type.

A T classified major minor and H minor in the same subject are equivalent to a double major course type.

Goals

These goals focus on the essential concepts and skills that students should know and be able to do as a result of studying Discovering Engineering ANU. They are intended student outcomes. This Discovering Engineering ANU course should enable students to:

- Demonstrate an awareness of existing and emerging engineering concepts, technologies and career pathways.
- Apply design and problem solving skills, processes and tools in the production of engineering solutions.
- Identify and understand the relevance of engineering systems to people, and the societal and ethical responsibilities of the engineers.
- Demonstrate oral, written or graphical techniques to communicate engineering concepts.

Student Group

Students apply to ANU for entry to this course and suitable applicants are selected at the beginning of their Year 11 year through a selection process. This process may include some or all of; a selection test, evidence provided of past academic successes, school/college recommendation.

The course caters for students who have an interest in, and aptitude for, Engineering Science and is offered as a way to deepen and broaden their understanding of this subject area. This course is at or very similar to a first year undergraduate level and students would be expected to have a good grasp of mathematics.

A student who achieves a satisfactory standard in this course will be made an early offer of entry to the ANU. The offer will be for a degree in the College Engineering and Computer Science. A pass in this Discovering Engineering ANU course is not a guarantee of an early offer. Early offers are decided by the Dean or delegate, ANU College Engineering and Computer Science. Students who are made early offers will also receive credit for Engn1211 Discovering Engineering in their university program.

Assessment

Assessment tasks will be consistent with the assessment requirements in the BSSS Course Framework endorsed 2007. There will be 4-6 summative assessment items. Weighting of assessment tasks will be consistent with the framework recommendations below.

Assessment Task Types	Design and Problem Solving	Technology Skills	Knowledge and Understanding
Task Types	Design brief for a client Process folio Portfolio	Practical project Practical test Model Design rationale or evaluation	Multimedia presentation with speaker's notes Research report Seminar presentation Test Written task
Weighting	25-50%	20-50%	25-50%

Engineers Australia Competencies

This course is aligned to deliver outcomes against the Engineers Australia (EA) Stage 1 Competencies as outlined in the EA Stage 1 table immediately below.

EA Stage 1 - competencies (extracted from Engineers Australia, 2011)

Element	Competency
1.4	Discernment of knowledge development and research directions within the engineering discipline
1.5	Knowledge of contextual factors impacting the engineering discipline
1.6	Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline
2.1	Application of established engineering methods to complex engineering problem solving.
2.3	Application of systematic engineering synthesis and design processes.
3.2	Effective oral and written communication in professional and lay domains.
3.3	Creative , innovative and pro-active demeanour.
3.4	Professional use and management of information.
3.5	Orderly management of self, and professional conduct.

Moderation

Teachers of H courses will be required to present portfolios of student work for verification that units are taught and assessed as documented (9.2.2 Moderation of H courses 2013 BSSS Policies and Procedures Manual)

A Year 11 review portfolio will be prepared in December, after the end of the first 1.0 point unit, for Moderation Day 1 the following year.

A Year 12 review portfolio will be prepared by Week 3, Term 4 following the completion of the Year 12 unit at the end of Term 3.

Review portfolios will present the work of two students at different grade levels.
Grades in H courses are not subject to moderation.

Bibliography

Recommended Text/s

There is no prescribed or recommended text for the course. Readings and links will be made available as required.

Books

Engineers Australia, 2011, *Stage 1 Competency Standard for Professional Engineer*

Horenstien, M., 2010, *Design Concepts for Engineers*, pp2-13, Prentice Hall, New York

Howell, S., 2002, *Engineering Design and Problem Solving*, pp41-46, Prentice Hall, Upper Saddle River, NJ

Web sites

ANU Academic Skills and Learning Centre

<https://academicskills.anu.edu.au/>

The Association of Professional Engineers, Scientists & Managers, Australia (APESAMA)

<http://www.apesma.asn.au>

Australian Computer Society (ACS)

<http://www.acs.org.au/>

College of Engineering and Computer Science (CECS) Research Groups

<http://cecs.anu.edu.au/research/groups>

Engineers Australia Competency Assessment

http://www.engineersaustralia.org.au/membership/assessment/assessment_home.cfm

EWB Challenge

<http://www.ewb.org.au/whatwedo/institute/ewb-challenge>

Institution of Engineers Australia

<http://www.engineersaustralia.org.au/>

Thingiverse

<http://www.thingiverse.com/>

Appropedia

<http://www.appropedia.org/>

TED Talks: Ideas Worth Spreading

<http://www.ted.com/>

These were accurate at the time of publication.

Specific Unit Goals

This unit should enable students to:

- demonstrate research into engineering concepts, technology and contexts
- use a CAD tool to model engineering components
- effectively communicate engineering concepts using different media

Content

- Exploration of disciplines across fields within engineering and computer science.
- An overview of the engineering design process including specific activities and techniques for defining a problem, identifying design criteria and generating and evaluating concepts
- Introduction to the use of Computer-Aided Design (CAD) tools, specifically SolidWorks
- Relevance and importance to modern engineering of the systems approach which encompasses the ANU's engineering philosophy and program.
- Engineering and related academic skills including, research, design, communication and reflection.

Teaching and Learning Strategies

In addition to specific classroom teaching including guest lectures by researchers and industry representatives, students will be introduced to major tools and techniques through the use of short on-line lectures designed specifically for this course. Students will also attend regular practicals and workshop sessions either in person or in an online capacity as appropriate. Attendance for workshop and practical sessions will be recorded.

The online component of this unit will consist of guest industry and academic lectures covering the nature of the engineering industry posted on the course website, short lecturettes detailing tools, techniques and evaluation instruments to use in designing engineering solutions and an online discussion forum. The number of hours expected to be delivered online will be approximately 5 to 6 hours per semester unit. The participation of students in the online component will be monitored by reference to the student's individual logon. The online component is critical for the student's good performance in this unit so it is expected motivation will be high amongst the student cohort to be involved.

Specific writing workshops will be conducted to assist the students develop the requisite writing skills appropriate to writing engineering reports.

A substantial amount of the student learning will involve project work, both individual and group. The Engineers Without Borders Australia (EWBA) Challenge will be used as a major project through the unit, providing a real-world problem and context for students. This will introduce further elements of engineering around the responsibilities of engineers in a global environment and an awareness of reflective and ethical practice.

Practicals

There are regular practical sessions scheduled throughout the unit. Practical attendance is compulsory and will be assessed through each students' individual engineering and design reflections due at the end of the unit.

Assessment

Assessment tasks will be consistent with the assessment requirements in the BSSS Course Framework endorsed 2007. There will be 4-6 summative assessment items. Weighting of assessment tasks will be consistent with the framework recommendations below.

Assessment Task Types	Design and Problem Solving	Technology Skills	Knowledge and Understanding
Task Types	Design brief for a client Process folio Portfolio	Practical project Practical test Model Design rationale or evaluation	Multimedia presentation with speaker's notes Research report Seminar presentation Test Written task
Weighting	25-50%	20-50%	25-50%

Presently the indicative assessment is as below:

- EWBA Research Report (20%)
- CAD Workshop Report (30%)
- Design Project Update (20%)
- Engineering Technology Report (30%)

Specific Unit Resources

Wattle Site

Lectures and other course material will be available on the course Wattle site. Additional reading will be provided in pdf form or via web links.

Websites

ANU Academic Skills and Learning Centre

<https://academicskills.anu.edu.au/>

The Association of Professional Engineers, Scientists & Managers, Australia (APESAMA)

<http://www.apesma.asn.au>

Australian Computer Society (ACS)

<http://www.acs.org.au/>

College of Engineering and Computer Science (CECS) Research Groups

<http://cecs.anu.edu.au/research/groups>

Engineers Australia Competency Assessment

http://www.engineersaustralia.org.au/membership/assessment/assessment_home.cfm

EWB Challenge

<http://www.ewb.org.au/whatwedo/institute/ewb-challenge>

Institution of Engineers Australia

<http://www.engineersaustralia.org.au/>

Thingiverse

<http://www.thingiverse.com/>

Appropedia

<http://www.appropedia.org/>

TED Talks: Ideas Worth Spreading

<http://www.ted.com/>

References

Engineers Australia, 2011, *Stage 1 Competency Standard for Professional Engineer*

Specific Unit Goals

This unit should enable students to:

- identify their responsibilities within the engineering profession
- design a solution to an open-ended problem using an engineering process
- reflect on and evaluate their own ideas and work

Content

- Using the engineering design process to complete a conceptual design and prototype or model for a real-world engineering problem from the EWBA Challenge.
- Use 3D printers to explore the possibilities of prototyping and engineering design.
- Detailed examination of the elements of engineering and the responsibilities of engineers in a global environment.
- Communicating engineering concepts using different media.
- Reflective and ethical practice applied through projects, engagement with course material and research assignments.

Teaching and Learning Strategies

In addition to specific classroom teaching including guest lectures by researchers and industry representatives, students will be introduced to major concepts through the use of on-line lectures designed specifically for this course. Students will also attend regular tutorials and workshop sessions either in person or in an online capacity as appropriate.

The online component of this unit will consist of guest industry and academic lectures covering the nature of the engineering industry posted on the course website, short lecturettes detailing tools, techniques and evaluation instruments to use in designing engineering solutions and an online discussion forum. The number of hours expected to be delivered online will be approximately 5 to 6 hours per semester unit. The participation of students in the online component will be monitored by reference to the student's individual logon. The online component is critical for the student's good performance in this unit so it is expected motivation will be high amongst the student cohort to be involved.

Specific writing workshops will be conducted to assist the students develop the requisite writing skills appropriate to writing engineering reports.

A substantial amount of the student learning will involve project work, both individual and group.

Group projects, engagement and research assignments will be extensively used in this second unit of study.

Practicals

There are regular practical sessions scheduled throughout the unit. Practical attendance is compulsory and will be assessed through each students' individual engineering and design reflections due at the end of the unit.

Assessment

Assessment tasks will be consistent with the assessment requirements in the BSSS Course Framework endorsed 2007. There will be 4-6 summative assessment items. Weighting of assessment tasks will be consistent with the framework recommendations below.

Assessment Task Types	Design and Problem Solving	Technology Skills	Knowledge and Understanding
Task Types	Design brief for a client Process folio Portfolio	Practical project Practical test Model Design rationale or evaluation	Multimedia presentation with speaker's notes Research report Seminar presentation Test Written task
Weighting	25-50%	20-50%	25-50%

Presently the indicative assessment is as below:

- Prototype Design Models and Report (30%)
- Engineering Design Report (50%)
- Individual Engineering Reflection (20%)

Specific Unit Resources

Wattle Site

Lectures and other course material will be available on the course Wattle site. Additional reading will be provided in pdf form or via web links.

Websites

ANU Academic Skills and Learning Centre

<https://academicskills.anu.edu.au/>

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