# Course Outline

Semester 2 2015

Never Stand Still

Engineering Mechanical and Manufacturing Engineering

# MMAN2100

# ENGINEERING DESIGN 2

# Contents

**Contact Hours**

| | Day | Time | Location |
|---|---|---|---|
| **Lectures** | Wednesday | 14:00 – 15:00 | Ainsworth G03 |
| | Thursday | 09:00 – 10:00 | Ainsworth G03 |
| **Demonstrations** | Wednesday<br>and Thursday | 15:00 – 16:00<br>10:00 – 11:00 | Red Centre M032<br>Ainsworth 102 |
| | Wednesday<br>and Thursday | 15:00 – 16:00<br>10:00 – 11:00 | Valentine 121<br>Ainsworth G02 |
| | Wednesday<br>and Thursday | 15:00 – 16:00<br>10:00 – 11:00 | Ainsworth G02<br>Ainsworth 202 |
| | Wednesday<br>and Thursday | 16:00 – 17:00<br>11:00 – 12:00 | Red Centre M032<br>Ainsworth 102 |
| | Wednesday<br>and Thursday | 16:00 – 17:00<br>11:00 – 12:00 | Valentine 121<br>Ainsworth G02 |
| | Wednesday<br>and Thursday | 16:00 – 17:00<br>11:00 – 12:00 | Ainsworth G02<br>Ainsworth |

# 3. CAD Drawings

While DESIGN PROCESS as such is the real message of this course, the CAD system is the medium which you are expected to use for the design work you do. Remember that a good drawing is NOT done by just pressing a button on the computer. It is the user who makes the outcome good or bad quality.

Remember to:

- Follow the Australian drawing standards throughout your work.
- Provide only minimal outline representation for proprietary items, e.g. couplings, pulleys, sprockets, gears, belts, chains, bearings, seals, nuts, screws, washers and bolts, etc.
- Where features are repeated, show in full once only and indicate repeats notionally.
- Use symmetry to advantage where it exists. Centrelines are a vital feature to achieve this.
- Last but not least, directly dimension sizes based on function requirements, rather than sequentially or from one corner of the product.
- Failure to abide by these guidelines will attract a significant penalty.

# 4. Teaching strategies

Lectures and demonstrations in the course are designed to cover the core knowledge areas in Engineering Design to help you develop a range of skills such as design processes, sketching, tools (CAD, 3D Printing, etc.), working with a project team, as well as application of analytical skills learnt in other courses.

Demonstrators will provide you with feedback and discussion on the assignments, and to understand the concepts and problems in greater depth. Assignments and marking structure are designed to give the “feel” of working on a project in industry.

The teaching strategies that will be used include:

- Presenting material in lectures so that you know how to approach various design tasks.
- Discussion and practice in demonstrators to answer queries and provide feedback on your design work.
- Group projects to familiarise you with dynamics experienced in real world engineering.

**Suggested approaches to learning in the course**

This class has hands-on skills and brain-thinking skills. Practice your hands-on skills as much as you can (that’s the fun part) but also understand how to apply some basic industry standards and tolerances to your designs.

- Attend the lectures. There are a few abstractions which seem simple when reading the moodle slide but require a bit of discussion (*and practice*) to get the context. The lowest marks from previous years are from people who sent their mates to take notes.
- Keep the material as a reference. Practice is better than book-memorizing.
- Gain hands-on experience in the demonstrations. Break things, make mistakes, then fix them again through iteration.
- Practice your skills every week so the skills can "burn in". They get rusty over time.
- Keep your logbook up to date. Work on it every session. This is a very good habit to learn now that will benefit you in the future. Every session means EVERY session.
- Strive for attention to detail from day one.
- Help your mates, in class, and especially in project groups. We're all in this together.
- Done practicing yet? No you're not. This class is only the beginning -

# 5. Course schedule

| Week | Wednesday (1-hr) | Thursday (1-hr) - |
|---|---|---|

RED items are group submissions. GREEN items are individual submissions.

Note: the course schedule is subject to change at short notice. Please make sure to keep updated during the lectures and via the course Moodle news forum.

# 6. Assessment

| Assessment task | Weight | Learning outcomes assessed | Due date, time, and submission requirements |
|---|---|---|---|
| Research and Requirements Document | 6.67% | 1 and 2 | Thursday Week 4, in Tutorial |
| Logbook 1st submission | 15% | 1, 3, and 6 | Thursday Week 6, in Tutorial |
| Conceptual Document | 6.67% | 1, 3, 5, and 6 | Thursday Week 7, in Tutorial |
| Midterm Exam | 10% | 1 and 3 | Thursday Week 8, in Lecture |
| Detailed Design and V&V Document | 6.67% | 1, 3, 4, and 5 | Thursday Week 9, in Tutorial |
| Logbook 2nd submission | 15% | 1, 3, and 6 | Thursday Week 13, in Tutorial |
| Group Project | 40% | 1, 2, 5, and 6 | Thursday Week 13, in Tutorial |
| **TOTAL** | **100%** | | |

You will be assessed on your design process, ability to follow standards for your chosen industry, and on the quality of your final product. There is no final exam.

Assignments are structured in a fashion similar to what you may experience in industry, and you should treat your demonstrator as you would a customer or an employer. All assignments are “deliverables”, completed by the team. Your team will need to show the ability to complete each assignment to a high standard (80% or better) in order to allow submission of the next deliverable. A 90% or better is required prior to attempting to go to prototype (3D printing). However, each team is allowed four resubmissions of assignments during the semester so you will have a chance to recover from the types of mistakes that would normally put you in peril of losing a job.

Each student will keep a logbook to evaluate your design process and provide feedback. Logbooks will be collected at week six and at the end of the project.

A midterm will test your individual (and practical) understanding of skills.

The Group Project will make the final grade. You will be evaluated on your ability to understand and meet customer requirements with your design and final product submission.

## Additional materials provided on Web

# Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

| | Program Intended Learning Outcomes |
|---|---|
| PE1: Knowledge and Skill Base | PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals |
| | PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing |
| | PE1.3 In-depth understanding of specialist bodies of knowledge |
| | PE1.4 Discernment of knowledge development and research directions |
| | PE1.5 Knowledge of engineering design practice |
| | PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice |
| PE2: Engineering Application Ability | PE2.1 Application of established engineering methods to complex problem solving |
| | PE2.2 Fluent application of engineering techniques, tools and resources |
| | PE2.3 Application of systematic engineering synthesis and design processes |
| | PE2.4 Application of systematic approaches to the conduct and management of engineering projects |
| PE3: Professional and Personal Attributes | PE3.1 Ethical conduct and professional accountability |
| | PE3.2 Effective oral and written communication (professional and lay domains) |
| | PE3.3 Creative, innovative and pro-active demeanour |
| | PE3.4 Professional use and management of information |
| | PE3.5 Orderly management of self, and professional conduct |
| | PE3.6 Effective team membership and team leadership |