

# ENGR 1042 SUSTAINABLE MATERIALS AND SMART MANUFACTURING

**Credit Points** 10

**Legacy Code** 301288

**Coordinator** James Berry ([https://directory.westernsydney.edu.au/search/name/James Berry/](https://directory.westernsydney.edu.au/search/name/James%20Berry/))

**Description** In this unit we explore the circular 'Cradle to Cradle' design philosophy through material choice and manufacturing systems. Introduced are conventional materials, smart materials, and manufacturing systems within an ecological assessment framework, equipping designers with the tools to select and assess materials and manufacturing processes appropriate to use. Students undertake a life cycle materials research project and a design for manufacture (DFM) project in the context of emergent Industry 4.0 principles.

**School** Eng, Design & Built Env

**Discipline** Other Engineering And Related Technologies

**Student Contribution Band** HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 1 subject

**Equivalent Subjects** ENGR 1032 Sustainable Design Materials  
Technology ENGR 1031 Sustainable Design 1 Materials Technology

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Explain the stages involved, and associated environmental and social impacts of contemporary materials processing and manufacturing
2. Identify and describe how the properties of materials relate to contemporary manufacturing processes
3. Use knowledge of materials properties and manufacturing processes in selecting suitable materials to meet a simple (closed) design brief for a physical artefact and to justify the selection
4. Describe potential applications of new and emerging materials and processes in the circular economy and Industry 4.0 framework

## Subject Content

1. Introduction to the product manufacturing processes of plastics, metals, wood products, glass, plastic composites and smart materials
2. Material finishes and coatings
3. Material selection and specification for product design
4. Material aesthetics and personalities
5. Sustainable material selection, specification and comparison
6. Life cycle analysis using material library tools
7. Design for manufacturing and assembly
8. Simulating plastic forming through making
9. Introduction to Industry 4.0 for manufactured material accreditation and tracking

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are

regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/Group Task
Quiz	3 x 30 Minutes	30	N	Individual
Applied Project	Mould simulation - 3 page report	40	N	Individual
Applied Project	Design proposal: 10 page diagrammatic visual design Report (500 words)	30	N	Individual

Prescribed Texts

- Thompson, R 2007, Manufacturing processes for design professionals, Thames & Hudson, New York.

Teaching Periods

## Autumn

### Parramatta - Victoria Rd

#### Day

**Subject Contact** James Berry ([https://directory.westernsydney.edu.au/search/name/James Berry/](https://directory.westernsydney.edu.au/search/name/James%20Berry/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ENGR1042\\_22-AUT\\_PS\\_D#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ENGR1042_22-AUT_PS_D#subjects))