**TERM 1 COURSE OVERVIEW**

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| **COMP&121** | **TOPIC: Composites I** | **CREDIT/HRS**: 5CR 20/60 | |
| **PURPOSE**: | **Introductory course in composite materials and processes, exploring fiber reinforced polymers and fabrication methods.** | | |
| **OUTCOMES:** | **At the successful conclusion of the course students will be able to reliably:**   1. Articulate the hazards, and workplace precautions that need to be taken, when working with hazardous chemicals such as resins, catalysts, epoxies, solvents, and fillers, and safely select and prepare materials and molds to make basic composite parts. 2. Compare and contrast the material properties of various matrix materials (resins), reinforcements (fabrics), and core materials, and demonstrate an understanding of basic design considerations in working with these materials to create composite products. 3. Build basic vacuum bags for simple shapes using a standard layup schedule. 4. Fabricate quality composite projects according to directions and specifications using hand lay-up methods, and prepare comprehensive lab reports using a template provided. | | |
| **TIMING:** | **TOPIC**: (Specific topics to achieve course outcomes.) | | **HOURS: LEC/LAB** |
| 1. Safety hazards and workplace precautions regarding hazardous chemicals such as resins, catalysts, epoxies, solvents, and fillers. 2. Vacuum bagging simple shapes, including basic pleat planning and execution. 3. Matrix Technology including thermosets, thermoplastics, and others. Discussion and lab work covering concepts of mix ratios, pot life, cross-linking, and viscosity. 4. Fiber Reinforcements including Glass, Carbon, Aramids, and others. Discussion and lab work covering characteristics of non-woven, woven, stitched, hybrid, braided and 3D woven reinforcements. 5. Basic Design Considerations including matrix and fiber dominated properties. Fabrication of solid laminate panel. 6. Basic Design Considerations including ply orientation and ply layup tables. Fabrication of solid laminate panel. 7. Basic Design Considerations including core materials. Fabrication of core laminate panel. 8. General Design Criteria of Core Panels including key property tests. Fabrication of core laminate panel. 9. Build a project that includes kitting, drape forming, and combining co-cured and co-bonded assemblies. | | 2/6  2/6  2/6  2/6  2/6  2/6  2/6  2/6  4/12 |
| **ASSESSMENT MEASURES** | Comprehensive knowledge based exams and/or quizzes.  Assess quality of student workmanship with respect to industry validated projects. | | |
| **KEY EXERCISES/**  **VIDEOS**: | Industry validated projects available at [www.coeaerospace.com](http://www.coeaerospace.com) including:   1. Flat panel wet layup open mold and vacuum bagged. 2. Flat panel prepreg balanced and unbalanced layups 3. Honeycomb core panel with plydrops | | |
| **KEY REFERENCES**: | **CCP Composites Cookbook**; <http://www.scribd.com/doc/205742424/CCP-Composites-Cookbook#scribd>; National STEM Consortium . . . <http://www.nationalstem.org/home/composites/>  *Essentials of Advanced Composite Fabrication & Repair* by Louis C. Dorworth and Ginger L. Gardiner | | |