




Electrical and Computer Engineering Design vs EGEN 310

| Discover | | | | | Communicate |
|--|---|---|---|--|--|
| Define | Ideate | Prototype | | | |
| | | | Test | | |
| <ul style="list-style-type: none">• <i>Background Research</i>• <i>Observation</i>• <i>Interaction with Stakeholders</i> | <p><i>Discoveries distilled into:</i></p> <ul style="list-style-type: none">• Functions (Verbs)  <ul style="list-style-type: none">• Objectives (Adverbs/Adjectives)  <ul style="list-style-type: none">• Constraints = standards, non-functional design boundaries | <p><i>Generate ideas for design concepts:</i></p> <ul style="list-style-type: none">• Functions to Morph Charts <p><i>Diverging Design Space</i></p>  <p><i>Converging Design Space</i></p> <ul style="list-style-type: none">• Objectives to Pugh Charts | <p><i>Build a prototype to begin to fill in gaps in design knowledge</i></p> <ul style="list-style-type: none">• Prototype ...<ul style="list-style-type: none">• To test most uncertain parts• If fundamental physical modeling is not possible• If statistical information is required• To learn about fit and tolerance of components• Long List of System Interfaces<ul style="list-style-type: none">• FMEA• System Integration | <p><i>Set up experiments and test to learn more about uncertain design aspects</i></p> <ul style="list-style-type: none">• Clearly identify variables in question• Define what constitutes an “effective” result• Summarize next steps | <p><i>Utilize MANY forms of communication to inform your team, client and stakeholders about your design process</i></p> <ul style="list-style-type: none">• <i>Face to Face Meetings:</i> Team meetings (with/without instructor), with other instructors, with Makerspace and Innovation Alley staff• <i>Written Communication:</i> Texts, emails, memos, A3, Readme Files, Smartsheet• <i>Visual Communication:</i> Fabrication drawings, terrain maps, sketches and schematics, photos, videos, charts to document design process, spreadsheets for numerical models |
| <ul style="list-style-type: none">• <i>Background research</i>• <i>Interaction with stakeholders</i>• <i>Understand applicable rules, regulations and standards</i>• <i>Get advice from experts</i> | <ul style="list-style-type: none">• <i>Define Design Criteria</i><ul style="list-style-type: none">• Goals• Requirements• Specifications• Constraints• <i>Prioritize requirements</i>• <i>Acceptance criteria and metrics</i> | <ul style="list-style-type: none">• <i>Alternatives Generation</i><ul style="list-style-type: none">• Free-wheeling brainstorming sessions• Imagination, creativity, freedom from excessive outside influences required!• Background knowledge is necessary to find alternatives that might otherwise go unidentified• <i>Alternatives Evaluation and Selection</i><ul style="list-style-type: none">• Rank alternatives against important criterion (“Pugh chart” or “evaluation matrix”) | <ul style="list-style-type: none">• <i>Detailed Design</i><ul style="list-style-type: none">• Detailed Layout Creation• Engineering Analysis• Low-Res Prototyping• Detailed Drawings• Assembly Drawings• <i>Manufacturing Planning</i><ul style="list-style-type: none">• Material/Parts Order• Finalize Operations Sheets• Fabrication Space/Access• QA Plan• <i>Fabrication and Assembly</i><ul style="list-style-type: none">• Detailed Fabrication• Manufacturing Operations• QA• Test Planning | <p><i>Set up experiments and test to learn more about uncertain design aspects</i></p> <ul style="list-style-type: none">• Clearly identify variables in question• Define what constitutes an “effective” result• Confirm requirements met (or not)• Summarize next steps | <p><i>Utilize MANY forms of communication to inform your team, client and stakeholders about your design process</i></p> <ul style="list-style-type: none">• <i>Face to Face Meetings:</i> Team meetings (with/without instructor), client/stakeholder meetings• <i>Written Communication:</i> Texts, emails, memos, A3, Readme Files, Smartsheet• <i>Visual Communication:</i> Circuit diagrams, sketches and schematics, photos, videos, charts to document design process, spreadsheets or other software output for numerical models |

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