ENAE 484 Team Expectations

- Lecture #26 – November 30, 2023
- Expectations for ENAE 484 teams for final milestone of ENAE 483

ENAE 484 Activities – Fall 2023 (from Lecture 12)

- Work in your ENAE 484 teams to do the planning and initial stages of design activities for ENAE 484
  - Level 1 requirements
  - Requirements flow-down
  - Work breakdown structure
  - Design reference mission
  - Baseline systems architecture
  - List of trade studies
  - Plans for experiments/hardware development
  - Schedule for Spring term

Top-Level Systems Documents

- Mission Statement (5 pts)
  - Simple one-line description of project: what and why
  - "Elevator pitch"
- Mission Objectives (5 pts)
  - 2-4 top-level objectives for your work in 484 next term
  - List of necessary high-level accomplishments by the end of Spring 2024
  - Should be grounded in Mission Statement (i.e., elevator pitch for taller buildings?)

Requirements Development

- Level 1 Requirements (5 pts)
  - Externally imposed by sponsor (e.g., RASC-AL, faculty)
- Level 2 (Systems) Requirements (5 pts)
  - "Flow-down" to successively next level of detail, focusing on issues of impact to entire team
- Level 3 (Discipline) Requirements (5 pts)
  - First cut at requirements for each of the discipline teams
- Every requirement at every level should have a clear path connecting it to one or more Level 1 requirements

Work Breakdown Structure (5 pts)

- Basically an outline of everything that has to be done to complete the systems design for ENAE 484
- Hierarchical breakdown into systems, subsystems, assemblies, components, etc.
- Frequently tied into scheduling process to ensure everything gets done in a timely manner
- Write it down now so it gets done later

Design Reference Mission (DRM)/CONOPS (10 pts)

- Detailed description of how a standard mission should proceed from beginning to end
- Could be graphical, numerical list, prose – just needs to provide information for designing the systems that accomplish the mission, e.g.
  - Moon to Mars: where the crew is housed for the "transit" phase, how they get to/from the lunar surface, requirements for the surface base
  - Lunar Evolution: additional capabilities needed and when, plans for expansion in terms of specific surface locations or regions

Systems Architecture Baseline (10 pts)

- Closely related to DRM/CONOPS, but outlining how things happen (as opposed to what things happen)
- Conceptual representation of each component of transportation/construction/operations of each phase of program development
- Development of initial baseline designs for major systems with CAD images

List of Trade Studies (10 pts)

- Every design decision should be based on an analytical trade study (Akin's Law #1!)
- Brainstorm the issues that affect design decisions, how you would quantify the parameters, and how you will perform the analysis to identify the best design decision
- Responsibility for each trade study should be assigned to specific group within the project
- Should also have schedule for when each trade study (design decision) should be completed

Plans for Experiments/Hardware Testing (10 pts)

- Each project should have a plan for incorporating hardware testing into the Spring activities
- Develop and document list of hardware development activities, with justification, challenges, and benefits
- Prioritize hardware testing objectives
- For top priorities, develop initial designs and list of items which need to be ordered prior to the end of the term
- Also include schedule showing that experimental results will be obtained in time to impact overall final design

Schedule for Spring Term (10 pts)

- Develop a Gantt chart for 484 design activities next term
- Include Preliminary Design Review (PDR) last week of February, Critical Design Review (CDR) last week of April, comprehensive final report at the end of the term
- Include deadlines such as RASC-AL deliverables
- Set your own internal milestones/deadlines to avoid crunches around PDR/CDR

Additional Grading Factors (20 pts)

- Project name
- Project logo
- High-quality graphics (particularly CAD)
- Insightful analysis
- Clear and engaging presentation following principles of Engineering Communications lecture
- Other evidence of extra effort