

**Course Outline (Preliminary)**  
**MAE-180B: Space Science and Engineering (Spring 2008)**

<b>Department of Mechanical and Aerospace Engineering University of California, San Diego</b>	
Course Description	Space mission concepts, architectures, analysis. Mission geometry. Astrodynamics. Orbit and constellation design. Space environment. Survivability. Payload and spacecraft design and sizing. Power sources and distribution. Thermal management. Structural design. Guidance and navigation. Space propulsion. Orbital debris. Cost modeling. Risk analysis. Space law and policy.
Textbook (required)	J. R. Wertz and W. J. Larson (Editors), <u>Space Mission Analysis and Design</u> , 3rd Edition, Microcosm Press, El Segundo, California, 1999; (Paperback: ISBN: 1-881883-10-8)
Instructor	Prof. M. Yousef Bahadori (E-mail: <a href="mailto:mbahadori@ucsd.edu">mbahadori@ucsd.edu</a> ) Office: EBU-II, Room 562; Cell Phone: (310) 480-2930. Office Hours: Wednesday, 4:00-4:50pm, or by appointment
TA/Reader	TBD
Course Topics	<ol style="list-style-type: none"> <li>1. Space mission analysis: mission life cycle, requirements, concepts, and architecture;</li> <li>2. Space mission geometry: celestial sphere, Earth geometry, satellite motion, mapping;</li> <li>3. Astrodynamics: Keplerian orbits, launch windows, orbit perturbations, maneuvering;</li> <li>4. Orbit design: the delta-V budget, transfer and parking orbits, space-referenced orbits;</li> <li>5. Space environment, hardness requirements, survivability requirements, orbital debris;</li> <li>6. Space payload design and sizing;</li> <li>7. Spacecraft design and sizing including spacecraft configuration and design budgets;</li> <li>8. Spacecraft power sources and power distribution;</li> <li>9. Spacecraft thermal management;</li> <li>10. Structures, mechanisms, and structural design;</li> <li>11. Spacecraft guidance and navigation;</li> <li>12. Propulsion subsystem selection and sizing, rocket propulsion, staging;</li> <li>13. Cost modeling: risk management, cost analysis, cost estimation;</li> <li>14. Space law and policy considerations.</li> </ol>
Schedule	<ul style="list-style-type: none"> <li>• Lectures: Monday and Wednesday, 7:00-8:20pm (HSS, Room 1330)</li> </ul>
Grading	<ul style="list-style-type: none"> <li>• Homework: 20 %</li> <li>• Midterm Exam: 35 %</li> <li>• Final Exam: 45 %</li> </ul>