

# THE NEW 2011 "NON-LAB" COGNATE SUBJECT'S LIST: (7/6/11)

[Square brackets show the non-math prerequisites for each course.]

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## Aeronautics and Astronautics (A A)

- 302 Incompressible Aerodynamics (4) [PHYS 123]
- 310 Orbital and Space Flight Mechanics (4) [M E 230]
- 311 Atmospheric Flight Mechanics (4)
- 312 Structural Vibrations (4) [M E 230]
- 332 Aerospace Structures II (4) [A A 331]
- 400 Gas Dynamics (3) [PHYS 123; A A 260 or CHEM E 260]
- 402 Fluid Mechanics (3) [A A 301]
- 405 Introduction to Aerospace Plasmas (3) [PHYS 123]
- 419 Aerospace Heat Transfer (3) [PHYS 123]
- 430 Finite Element Analysis in Aerospace (3) [CEE 220]
- 480 Systems Dynamics (3) [A A 312]

## Astronomy (ASTR)

- 321 The Solar System (3) [PHYS 224]
- 322 The Contents of Our Galaxy (3) [PHYS 225]
- 323 Extragalactic Astronomy and Cosmology (3) [ASTR 322]
- 421 Stellar Observations and Theory (3) [ASTR 322]
- 423 High-Energy Astrophysics (3) [PHYS 224; PHYS 225]
- 425 Cosmology (3) [PHYS 224; PHYS 225]
- 427 Methods of Computational Astrophysics (3)

## Atmospheric Science (ATM S)

- 301 Introduction to Atmospheric Sciences (5) [PHYS 121, 122 & 123]
- 321 The Science of Climate (3) [PHYS 121, 122 & 123]
- 340 Introduction to Thermodynamics and Cloud Processes (3) [ATM S 301]
- 431 Boundary-Layer Meteorology (3) [ATM S 340 or PHYS 224]
- 441 Atmospheric Motions I (3)
- 442 Atmospheric Motions II (5) [ATM S 441]
- 460 Water in the Environment (3) [PHYS 123]

## Chemical Engineering (CHEM E)

- 326 Chemical Engineering Thermodynamics (4) [CHEM E 310; CHEM 456]
- 330 Transport Processes I (5) [CHEM E 310]
- 340 Transport Processes II (4) [CHEM E 330]
- 435 Transport Processes III (4) [CHEM E 326 and 340]

## Chemistry (CHEM)

- 418 Nuclear Chemistry (3) [CHEM 453, 455, or 475]
- 453 Physical Chemistry for Biochemists (3) [CHEM 452 or 456; PHYS 123]
- 455 Physical Chemistry (3) [CHEM 155, 162, or 164; PHYS 123]
- 456 Physical Chemistry (3) [CHEM 155, 162, or 164; PHYS 123]
- 457 Physical Chemistry (3) [CHEM 455 or 475; 456, 476 or CHEM E 326]
- 460 Spectroscopic Molecular Identification (3) [CHEM 224, 239 or 337]
- 475 Honors Physical Chemistry (3) [CHEM 155, 162, or 164; PHYS 123]

## Civil & Environmental Engineering (CEE)

- 342 Fluid Mechanics (4) [CEE 220; M E 230; PHYS 122]
- 345 Hydraulic Engineering (4) [CEE 342]
- 379 Elementary Structures I (4) [CEE 220]
- 380 Elementary Structures II (4) [CEE 379]
- 459 Advanced Structural Mechanics (3) [CEE 379]

## Earth & Space Sciences (ESS)

- 412 Introduction to Seismology (3) [ESS 411 or PHYS 123]
- 413 Geophysics: The Earth (3) [ESS 412; PHYS 322]
- 414 Geophysics: Fluids (3) [PHYS 322]
- 415 Space and Plasmas (3) [PHYS 321]
- 416 Geophysics: The Atmosphere (3) [ESS 414]
- 424 Water in the Environment (3) [PHYS 123]
- 471 Introduction to Space Physics (3) [PHYS 123]

## Electrical Engineering (E E)

- 361 Applied Electromagnetics (5) [1.0 in E E 233; PHYS 123]
- 467 Antennas: Analysis and Design (4) [1.0 in E E 361]
- 480 Microwave Engineering I (4) [1.0 in E E 361]
- 482 Semiconductor Devices (4) [E E 332 and 361]
- 485 Introduction to Photonics (4) [E E 361 or PHYS 123]

## Engineering (E)

- 360 Introductory Acoustics (3) [PHYS 123]

## Mechanical Engineering (M E)

- 331 Introduction to Heat Transfer (4) [M E 333 or CEE 342]
- 333 Introduction to Fluid Mechanics (5) [AMATH 301; M E 323]
- 431 Advanced Fluid Mechanics (4) [M E 333]
- 440 Advanced Mechanics of Materials and Solids (3) [M E 354]
- 469 Applications of Dynamics in Engineering (4) [M E 374]
- 470 Mechanical Vibrations (3) [M E 373]
- 478 Finite Element Analysis (4) [M E 123 and 374]

## Material Sciences Engineering (MSE)

- 331 Crystallography and Structure (3) [MSE 170]
- 351 Electronic Properties of Materials (3) [MSE 170 and 331]
- 462 Mechanical Behavior of Materials II (4) [AA 210; CEE 220; MSE 362]
- 473 Noncrystalline State (4) [MSE 170, 321 and 331]
- 477 High Temperature Materials (4) [MSE 310 and 321]
- 481 Science and Technology of Nanostructures (3)

## Oceanography (OCEAN)

- 420 Physical Processes in the Ocean (4) [PHYS 123; OCEAN 210]
- 422 Ocean Dynamics (3) [PHYS 123; OCEAN 420]
- 423 Ocean Circulation and Climate (3) [PHYS 123]

## Physics (PHYS)

- 311 Relativity and Gravitation (3) [2.0 in PHYS 123]
- 315 Applications of Quantum Mechanics (3) [2.0 in PHYS 224, 225, 227]
- 323 Electromagnetism (4) [PHYS 322]
- 324 Quantum Mechanics (4) [2.0 in both PHYS 225 and 228]
- 325 Quantum Mechanics (4) [PHYS 224]
- 328 Statistical Physics (3) [PHYS 224 and 324]
- 329 Mathematical Methods and Classical Mechanics (3) [2.0 in PHYS 228]
- 407 Physics by Inquiry II (5) [2.0 in PHYS 123]
- 408 Physics by Inquiry II (5) [PHYS 407]
- 409 Physics by Inquiry II (5) [PHYS 408]
- 421 Contemporary Atomic Physics (3) [PHYS 323; PHYS 325]
- 422 Contemporary Nuclear and Particle Physics (3) [PHYS 226, 322, 325]
- 423 Contemporary Condensed Matter Physics (3) [2.0 in PHYS 324]
- 429 Biophysics (3) [PHYS 224 and 225]
- 436 Nonlinear Dynamics and Chaos (4)
- 441 Quantum Physics (4)
- 460 Water in the Environment (3) [PHYS 123]
- 501 to 578 Graduate physics courses

## ELECTIVE REQUIREMENTS FOR THE NEW TRACKS PROGRAM:

### Physics Requirement: Applied Physics Option

- 4) Electives

Needs: 9.0 credits

From:            0PHYS 311,315,323,324,325,328,329,407,  
0PHYS 408,409,421 TO 429,436,441,460,501 TO 578  
0A A 302,310 TO 312,332,400,402,405,419,430,480,  
0ASTR 321 TO 323,421,423,425,427 0ATM S 301,321,340,  
0ATM S 431,441,442,460 0CHEM 418,453,455 TO 457,  
0CHEM 460,475 0CHEM E310,326,330,340,435  
0CEE 342,345,379,380,459 0E E 361,467,480,482,  
0E E 485 0ENGR 360 0ESS 412 TO 416,424,471,  
0M E 331,333,431,440,469,470,478, 0MSE 331,  
0MSE 351,462,473,477,481 0OCEAN 420,422,423  
>>MAX ONE FROM: 0PHYS 331 OR 335 OR 431 OR 432 OR  
0PHYS 433 OR 434 OR 0ASTR 480 OR 481  
>>MAX ONE FROM: 0A A 198 OR 0ASTR 115 OR  
0ASTR 201 OR 0ATMS 211 OR 0CEE 220 OR  
0CHEM 144 OR 0E E 135 OR 0ESS 102 OR  
0ESS 210 OR 0M E 123 OR 0MSE 170 OR  
0NME 220 OR OCEAN 200

### Physics Requirement: Comprehensive Option

- 5) Upper-division lecture electives

Needs: 6.0 credits

From:            0PHYS 311,315,323,325,328,329,  
0PHYS 407 TO 409,421 TO 429,436,460,501 TO 578  
0A A 302,310 TO 312,332,400,402,405,419,430,480,  
0ASTR 321 TO 323,421,423,425,427 0ATM S 301,321,340,  
0ATM S 431,441,442,460 0CHEM 418,453,455 TO 457,  
0CHEM 460,475 0CHEM E310,326,330,340,435  
0CEE 342,345,379,380,459 0E E 361,467,480,482,  
0E E 485 0ENGR 360 0ESS 412 TO 416,424,471,  
0M E 331,333,431,440,469,470,478, 0MSE 331,  
0MSE 351,462,473,477,481 0OCEAN 420,422,423