Progress Report to Advisory Board

Undergraduate Education

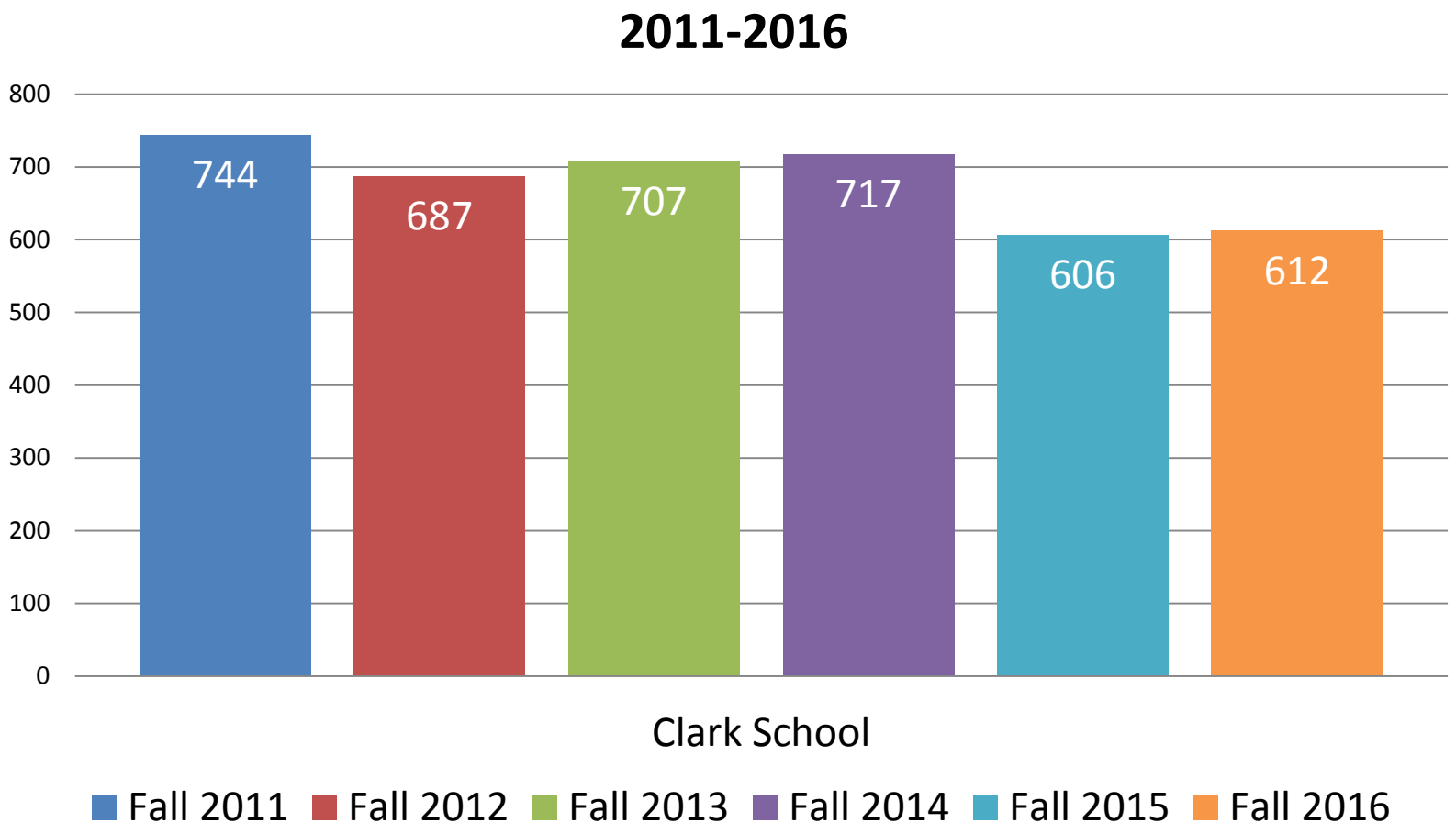
Mel Gomez
Associate Chair for Undergraduate Education

- Freshmen Admission/ Enrollment/Graduation Data
- ABET Self-Study Updates
- UMD-EE SMD Updates
- New Course Focus: ENEE 408R

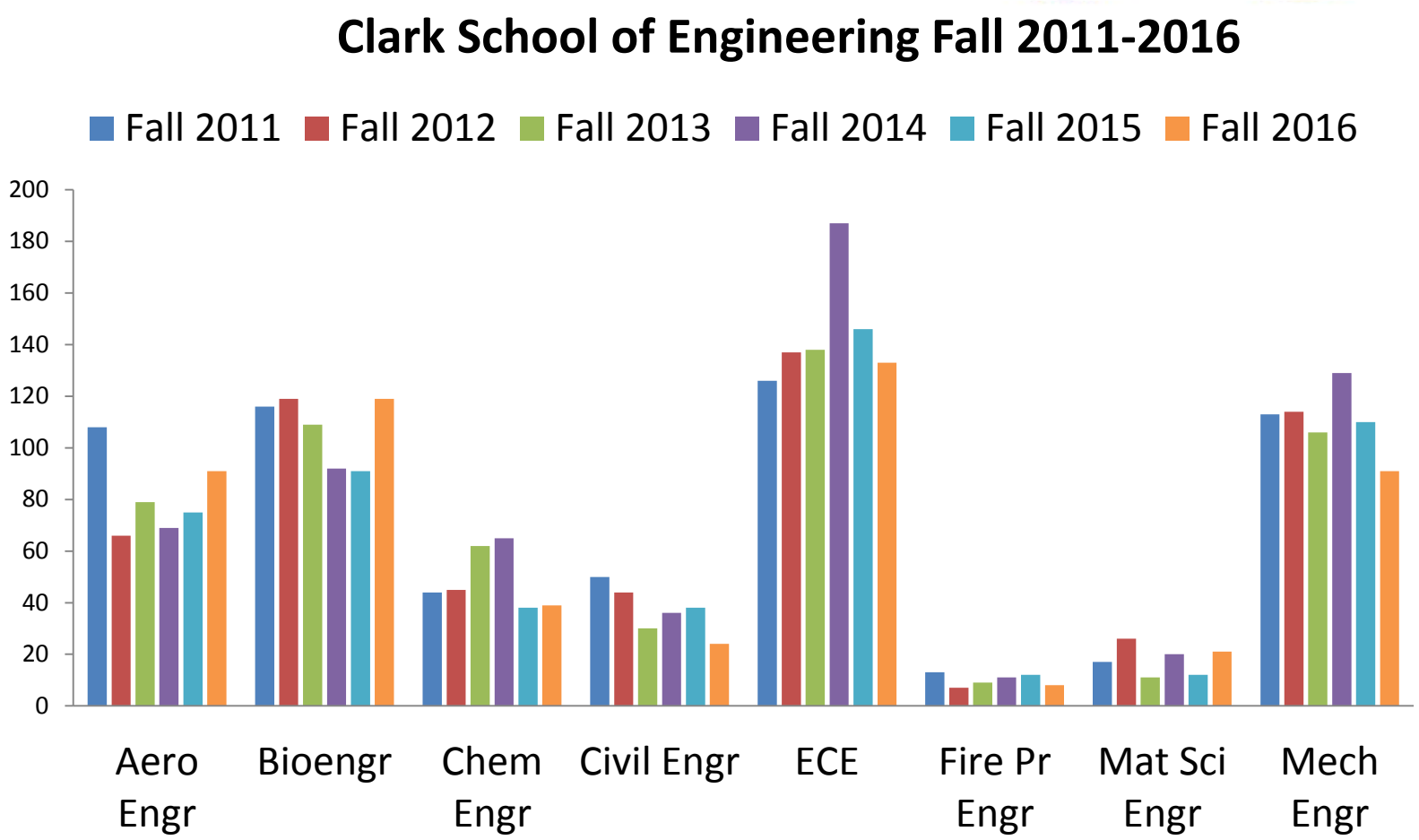
Undergraduate Staff

- Neruh Ramirez, Director
- Kathryn Weiland, Asst. Director
- Jennifer Wivell, Adviser
- Mary Walters, Adviser
- Pamela Talbott, Program Admin Specialist

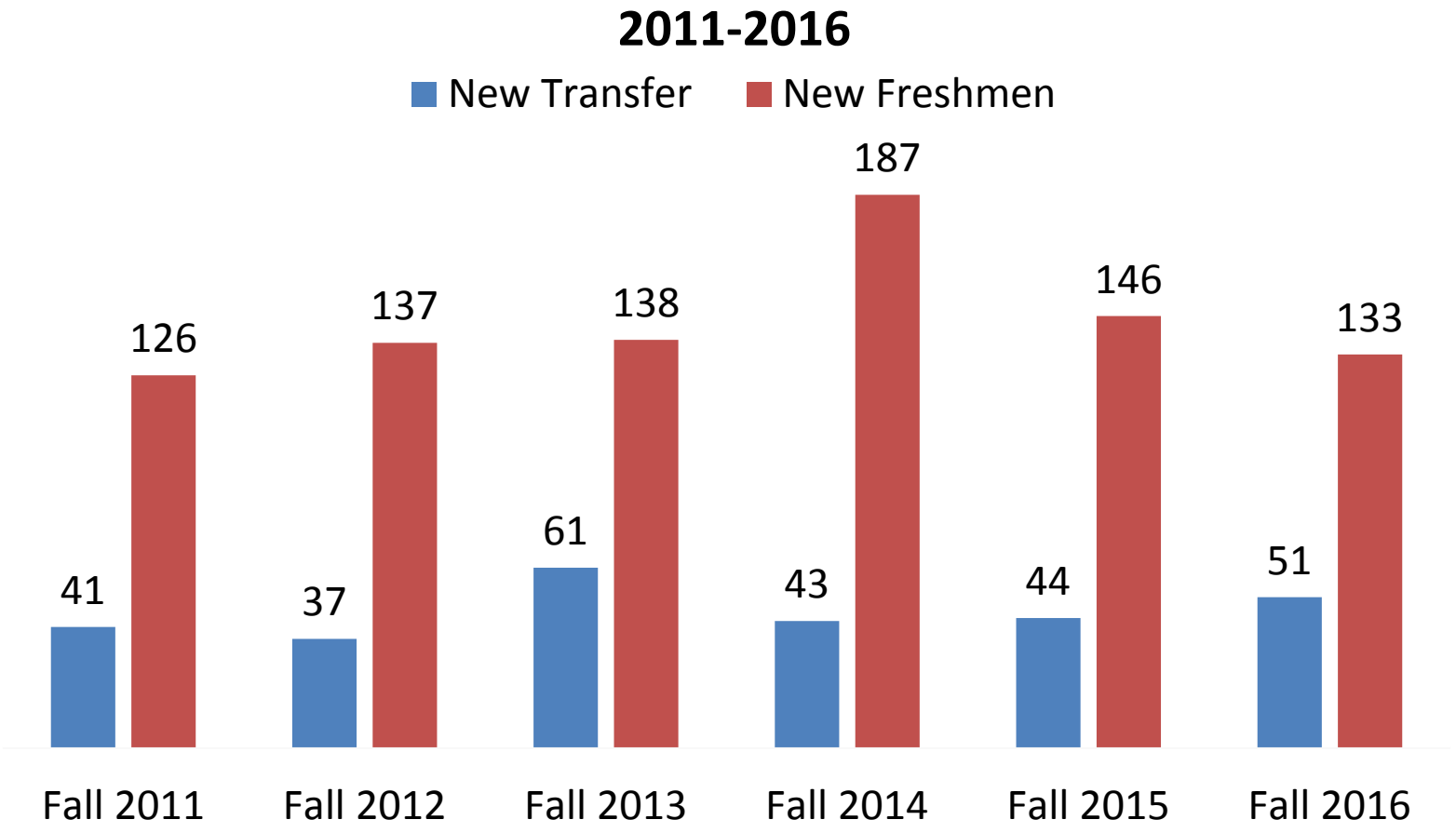
A.J. Clark School Freshmen Enrollment



ENGR Freshmen Enrollment

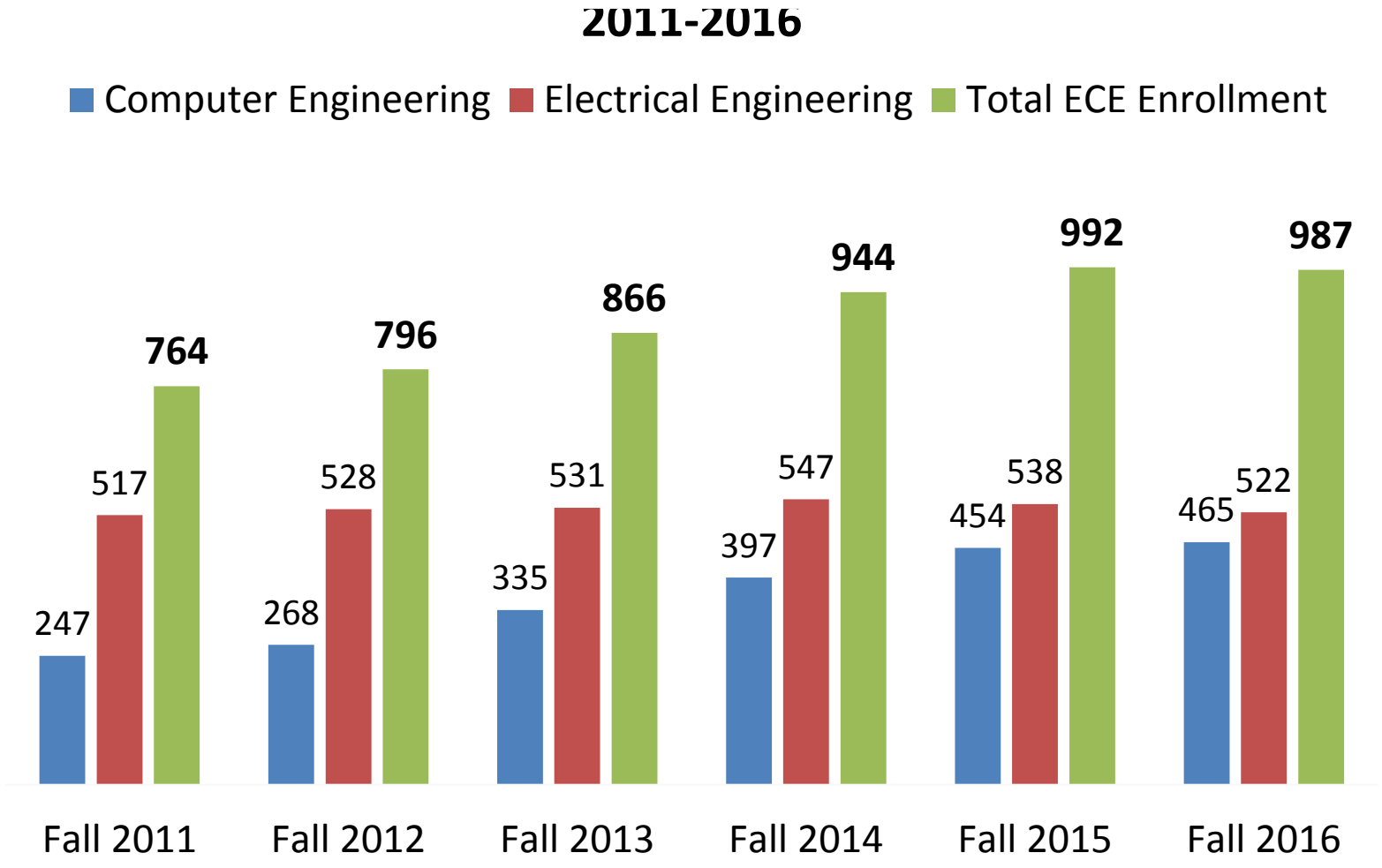


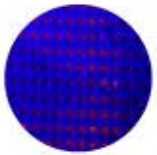
ECE Freshmen/Transfer Enrollment



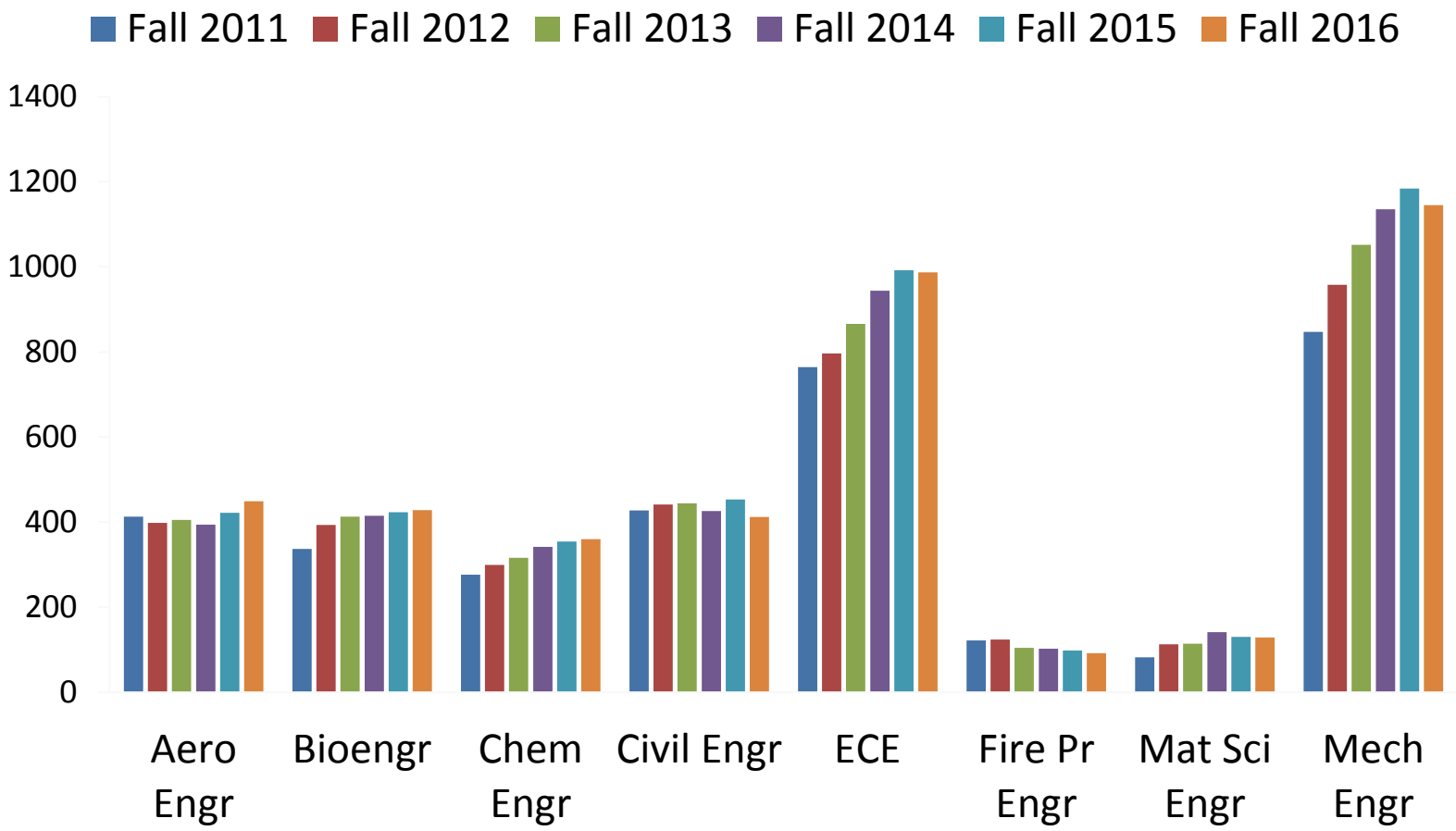
Anticipated Enrollment Fall 2017 = 188

ECE Total Enrollment

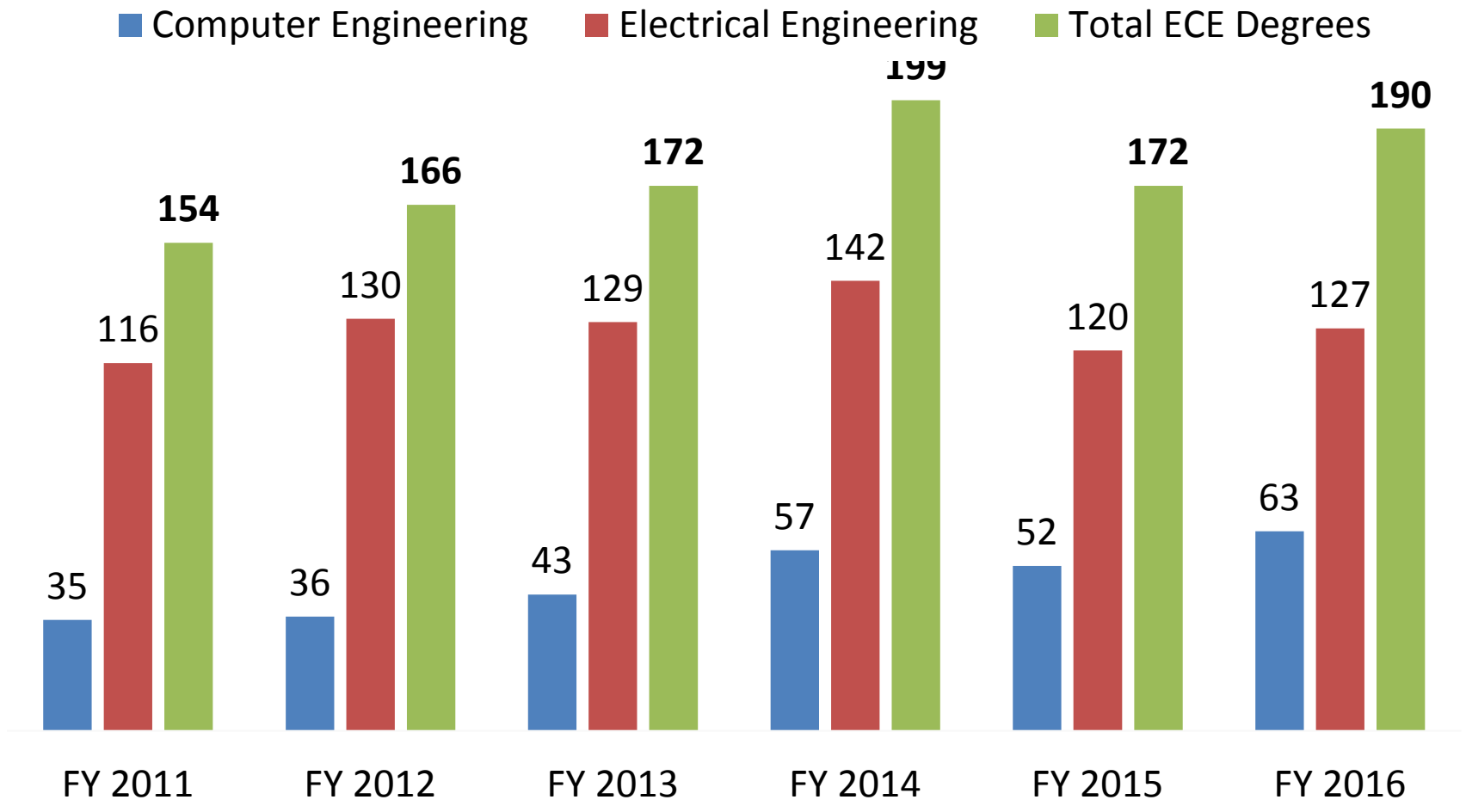




ENGR Undergraduate Enrollment 2016



ECE Undergraduate Degrees 2011-2016



ABET

- Important Dates:

  EE and CpE **Self-Study Reports** due on July 1, 2017

  Program Evaluators visit in October, 2017

Summary of Major Changes since last ABET Visit

- PEO Revised and Approved by Faculty
- Standardized assessment methods for Capstone Courses
- Nine (9) New Courses
  - ENEE 101 – Introduction to ECE
  - ENEE489A – Small Antennas
  - ENEE459B - Reverse Engineering and Hardware Security
  - ENEE439M - Machine Learning
  - ENEE408R – Electric Bikes
  - ENEE447 – Operating Systems
  - ENEE459E - Introduction to Cryptology
  - ENEE459V - Introduction to Embedded Systems
  - ENEE476 - Renewable Energy
- Improved Laboratory Infrastructures
  - Texas Instruments Discovery Laboratory
  - Jimmy Lin Advanced Electronic Devices Laboratory
  - Hughes Network Communications Laboratory
- Established New Computer Engineering Minor for EE and other Majors
- Established Satellite EE Program in Southern Maryland (SMD-EE)

EE and CpE Self-Study Reports

- Background
- Criterion 1-Students
- Criterion 2-PEOs
- Criterion 3-Student Outcomes (a-k)
- Criterion 4-Continuous Improvement
- Criterion 5-Curriculum
- Criterion 6-Faculty
- Criterion 7-Facilities
- Criterion 8-Institutional Support

Criterion 1. Students

- Clark School Admission Standards
- Internal and External Transfer Admission Criteria
- Student Performance Review and Academic Success
- Advising and Career Guidance
- Graduation Requirements

*sample transcripts will be provided to program evaluators

Criterion 4. Continuous Improvement

- Simplified Assessment Strategy

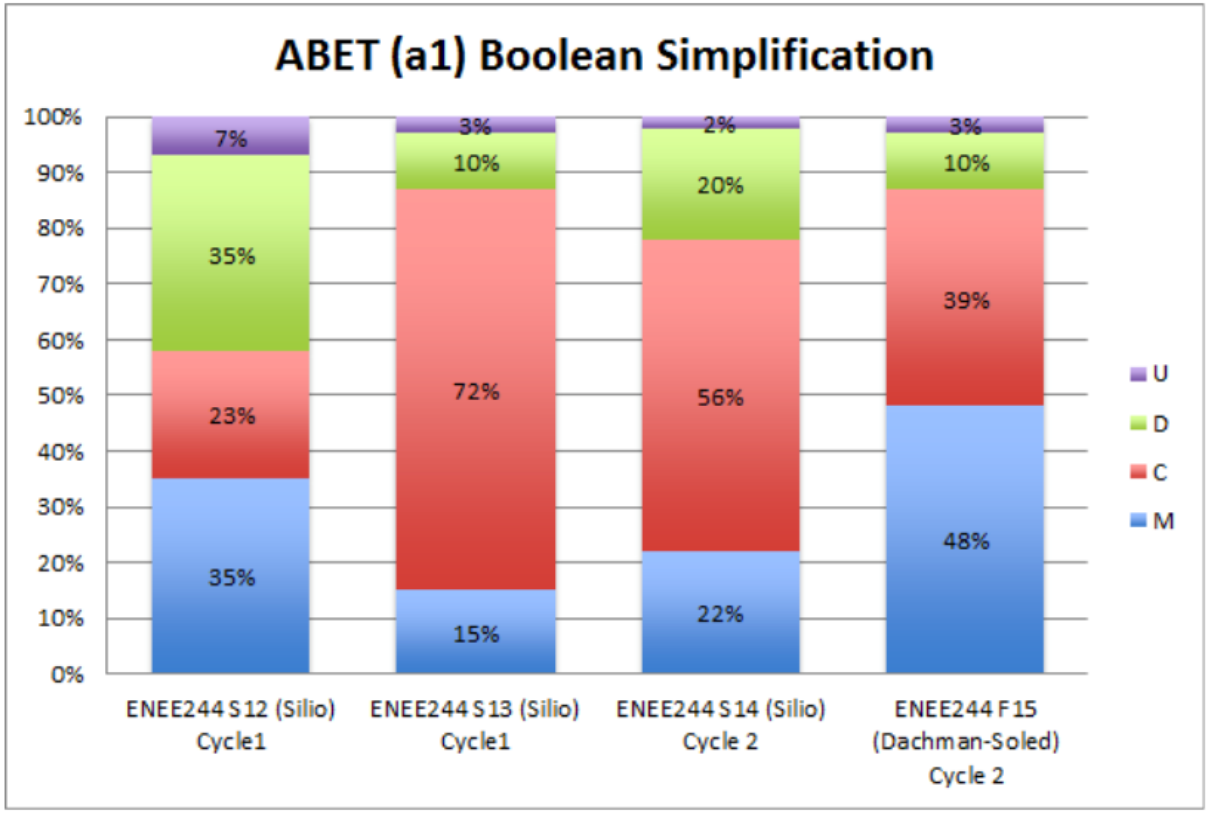


Figure 4(a1): ABET (a1) Assessment Summary Results for Cycle 1 and Cycle 2. (M=Mastery, C=Competent, D=Developing, UD+Underdeveloped)

Criterion 5. Curriculum

BS EE (120 credits)

– Math & Science		29
– ENES100		3
– ENEE101		3
– Disciplinary Foundation		39
– EE Technical Electives	13	
– General Tech Electives		12
– Professional Writing		3
– Gen Ed		18

BS CpE (122 credits)

– Math & Science	25
– ENES100	3
– ENEE101	3
– Disciplinary Foundation	48
– Technical Electives	22
– Professional Writing	3
– Gen Ed	18

Criterion 6 – Faculty

- Professors - 45
- Associate Professors - 7
- Assistant Professors - 5
- Adjunct/Emeritus - 13

Ten (10) NSF Presidential Young Investigator (PYI) Award
One (1) ONR Young Investigator
Two (2) Presidential Early Career Award for Scientists or Engineers (PECASE)
Ten (10) NSF Research Initiation Awards
Eighteen (18) recipients of NSF CAREER Awards
Thirty-Five (35) IEEE Fellows
Two (2) ACM Fellows, Seven (7) APS Fellows, Five (5) OSA Fellows
Three (3) AAAS Fellows, One (1) IOP Fellow
Three (3) Distinguished University Professor
Nine (12) Distinguished Scholar/Teacher

Criterion 7 – Facilities

(13 Teaching Laboratories)

- BAE Control Systems Lab
- Computer Lab
- Hughes Communications Design Lab*
- Electrical Machines Lab
- Jimmy Lin Advanced Electronics Design Lab*
- Electric Circuits Lab
- Jasmine Telecommunications Lab
- Fabrication Lab (Kim)
- Microcomputer Lab
- Microelectronics Design Lab
- Photonics Lab
- TI Discovery Lab*
- Systems Engineering and Integration Lab

UMD SMD-EE STATUS

Start: Fall 2017, currently 10 students registered in the program

Fall Semester

ENEE 303 Analog and Digital Electronics @SMHEC, in person
ENEE 322 Signals and Systems Theory @SMHEC, online
ENEE 350 Computer Organization@SMHEC, online
ENEE 380 Electromagnetic Theory @SMHEC, in person

Winterterm

ENEE 200 Ethics @UMD, online
ENGL 393 Technical Writing @UMD, online

Spring Semester

ENEE 307 Electrical Circuits Design Lab @SMHEC, in person
ENEE 313 Introduction to Device Physics @SMHEC, in person
ENEE 324 Engineering Probability @SMHEC, online
ENEE 381 EM Wave Propagation @SMHEC, in person
ENEE 4XX Transform Methods @SMHEC, in person

Courses to be offered in senior year

Fall Semester (5 courses)
ENEE 425N Signal Processing @SMHEC
ENEE 4XX Advanced Laboratory @UMD
ENEE 490N Wireless Communications @SMHEC
ENEE 488A Topics In Cybersecurity @SMHEC
ENEE 440N Microprocessors @SMHEC

ENGL 393 Technical Writing @UMD

Senior Year, Spring Semester (5 courses)
ENEE 408X Capstone Design, @UMD
ENEE 420N Communication Systems @SMHEC
ENEE 426N Communication Networks @SMHEC
ENEE 446N Digital Computer Design @SMHEC
ENEE 488B Direct Study: Navy Hardware @SMHEC

ENEE 408R – Electric Bikes

Course Piloted Spring 2017, 15 Students, 3 teams

- Design Challenges
  - **URBAN BIKE** that can travel 50 miles in a single charge, can be fully charged in 2 hours
  - **MOUNTAIN BIKE** that can climb vey steep hills (or climb a set of stairs)
  - **SELF DRIVING TRICYCLE** that can autonomously travel from one point of campus to another

Student Teams

- Team Green (Urban) has 3EE and 3CpE
- Team Red (Mountain) has 4EE and 2CpE
- Team Yellow (Self Drive) has 1EE and 2CpE

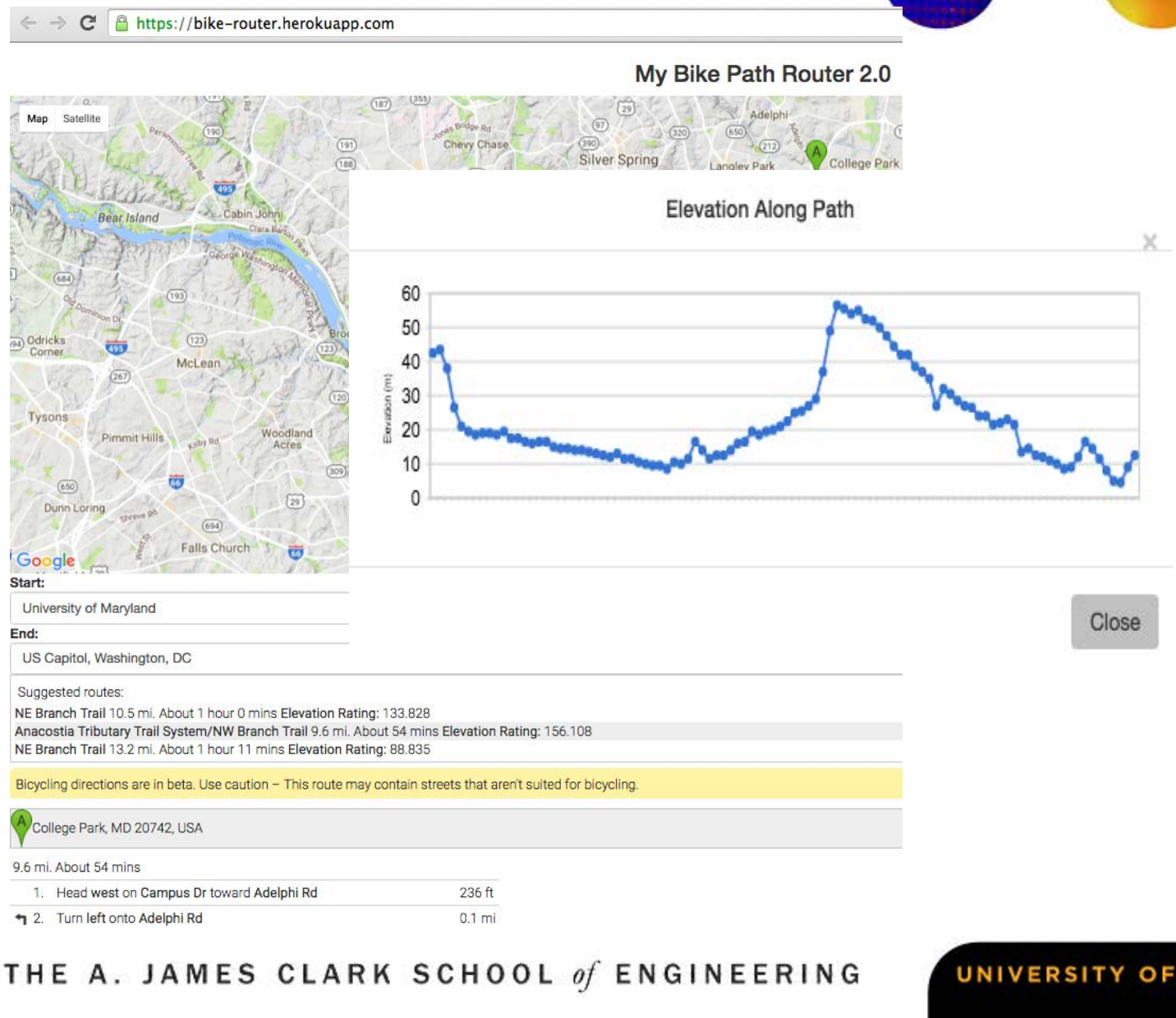
Urban Bike Design Issues

- Motor Selection (size, placement, efficiency)
- Power and energy
- Battery (characteristic, charging and discharging)
- Bicycle characteristics (weight, reliability)
- Metrics and Testing
- Add ons: wireless control, route and terrain mapping APP)

Urban Bike – Finished Product

https://bike-router.herokuapp.com/

Bike Router App

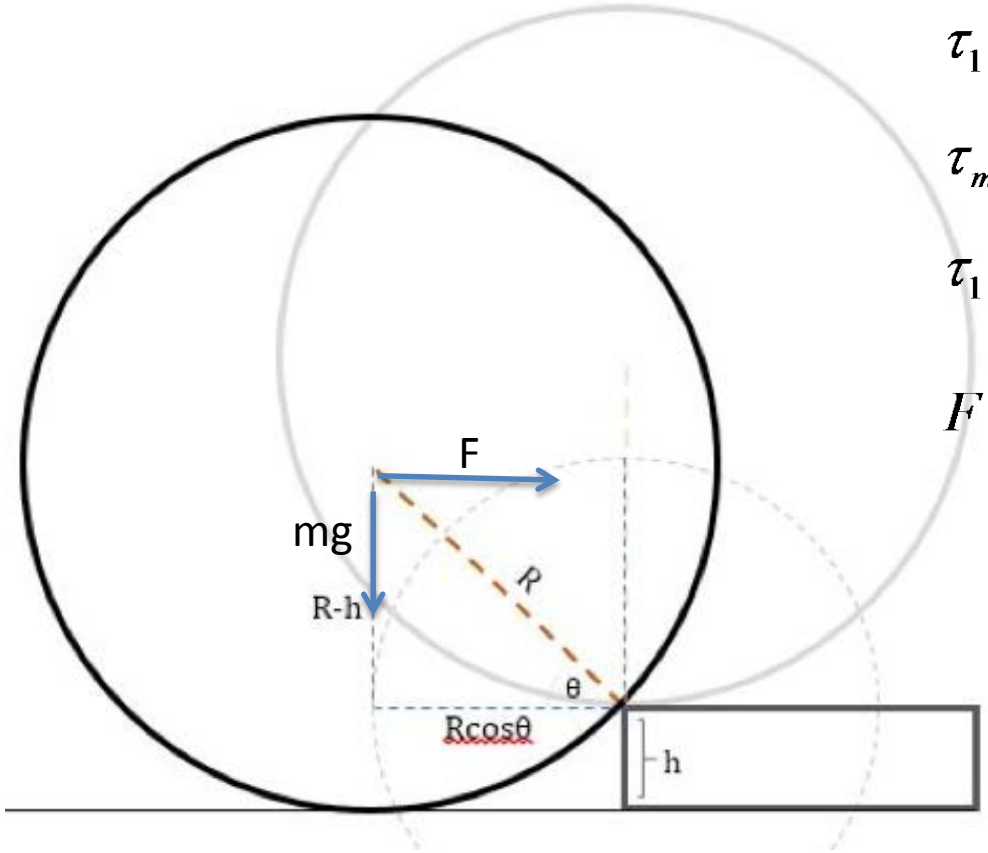


Mountain Bike - Design Issues

- Motor (torque, size, power, placement)
- Power and heating
- Power monitoring
- Battery charging
- Bicycle characteristics (weight, braking, suspension)
- Reliability Testing
- Add on: wireless control, anti-theft device, real-time system monitoring)

Mountain Bike Finished Product

Physics of Climbing Stairs



$$\tau_1 = F(R-h)$$

$$\tau_{mg} = mg(R\cos\theta) = mg\left(\sqrt{2hR-h^2}\right)$$

$$\tau_1 = \tau_{mg}:$$

$$F = mg\frac{\sqrt{2hR-h^2}}{R-h}$$

$$Given:$$

$$m = 15kg(bike) + 75kg(rider) = 90kg$$

$$R = 0.35m,\ h = 0.18m,\ v = 1m/s$$

$$Then:$$

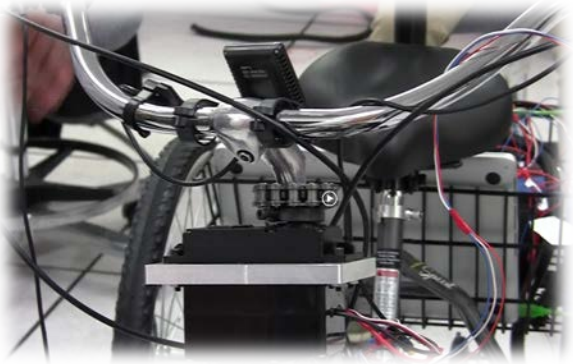
$$F = 1587N$$

$$\rightarrow P = Fv = 1587W$$

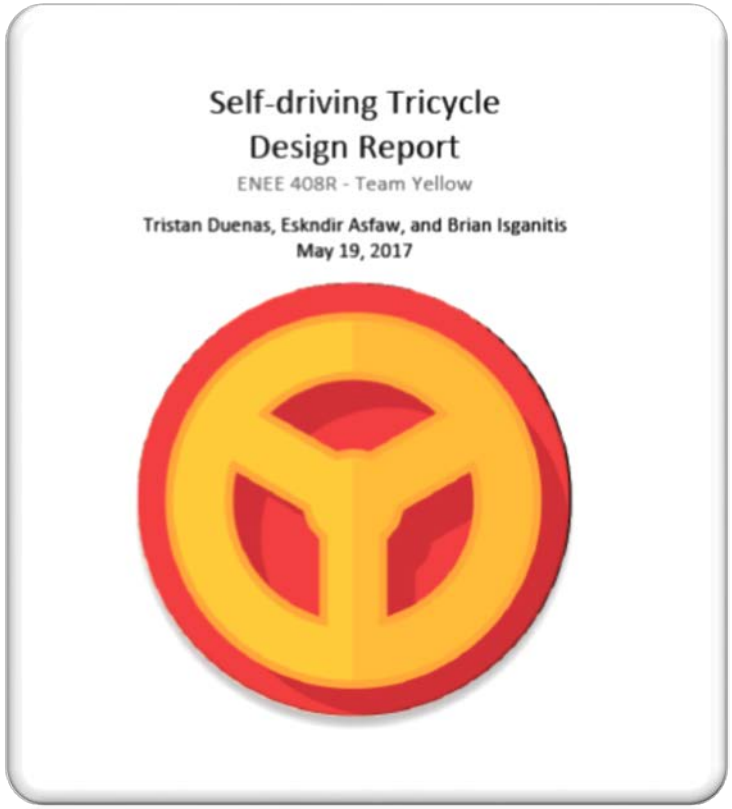
Self Driving Tricycle Design Issues

- Steering System – microprocessor controlled
- Braking System – microprocessor controlled
- Control– microprocessor controlled
- Obstacle recognition– sensors
- Wireless communication
- Path following and navigation– image processing

Finished Product



Ability to Write: Sample Final Report



Self-driving Tricycle
Design Report

ENEE 408R - Team Yellow

Tristan Duenas, Eskndir Asfaw, and Brian Isganitis
May 19, 2017

Thank you!