2016 Final Exam – Report
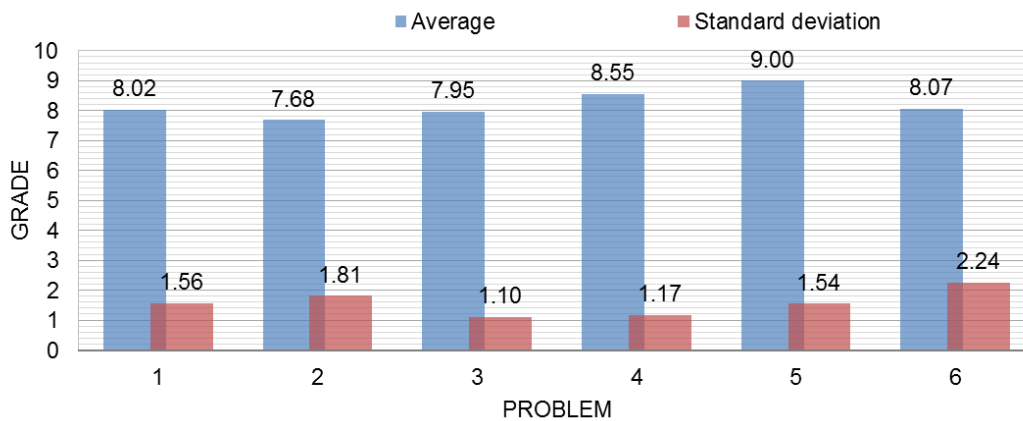
General

Total number of students	23
Attended	22
Missed	1
Number of problems	6
Average grade	82.12
Standard deviation of grades	11.79
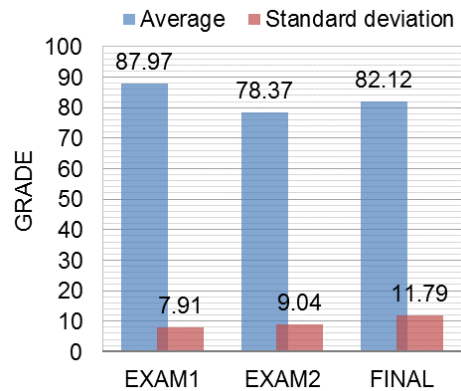
Individual problem breakdown

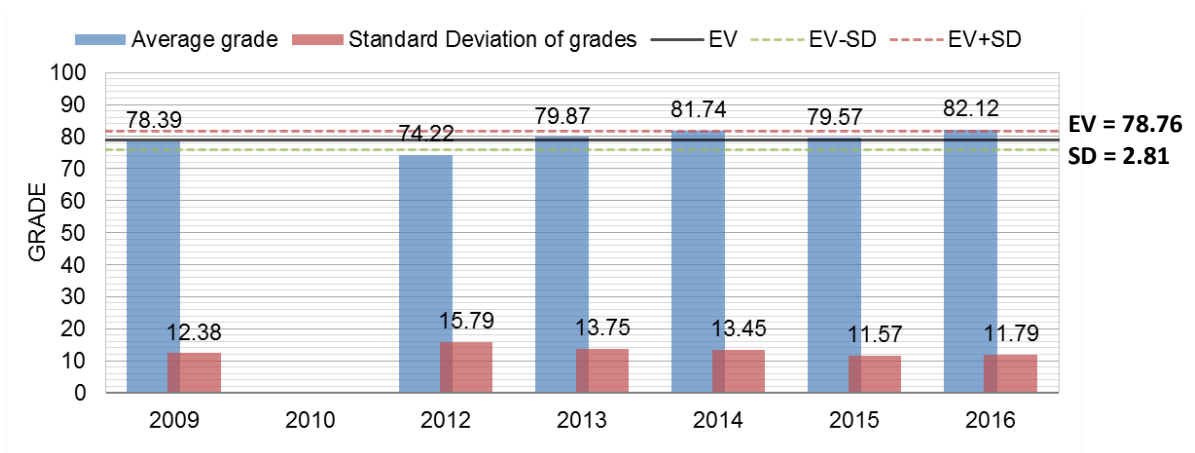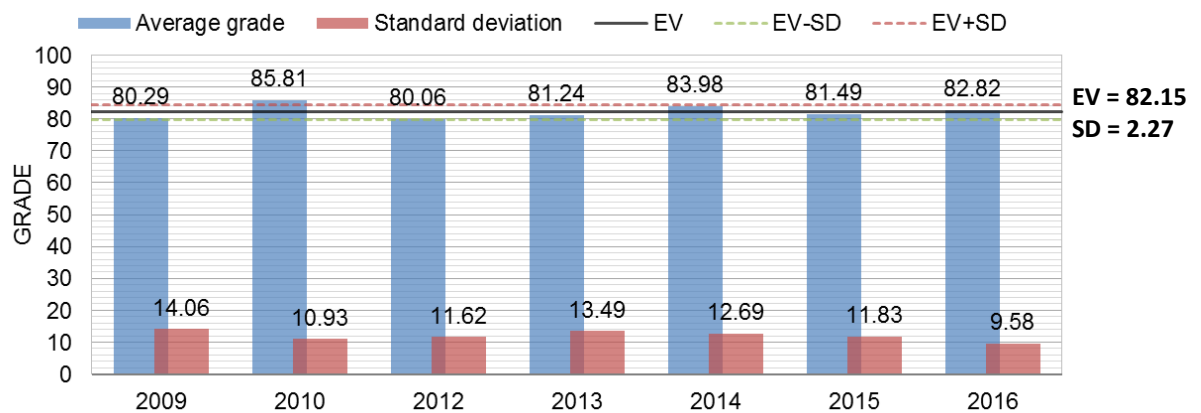| Problem	1	2	3	4	5	6
Average grade	8.02	7.68	7.95	8.55	9.00	8.07
Standard deviation of grades	1.56	1.81	1.10	1.17	1.54	2.24

Grade distribution
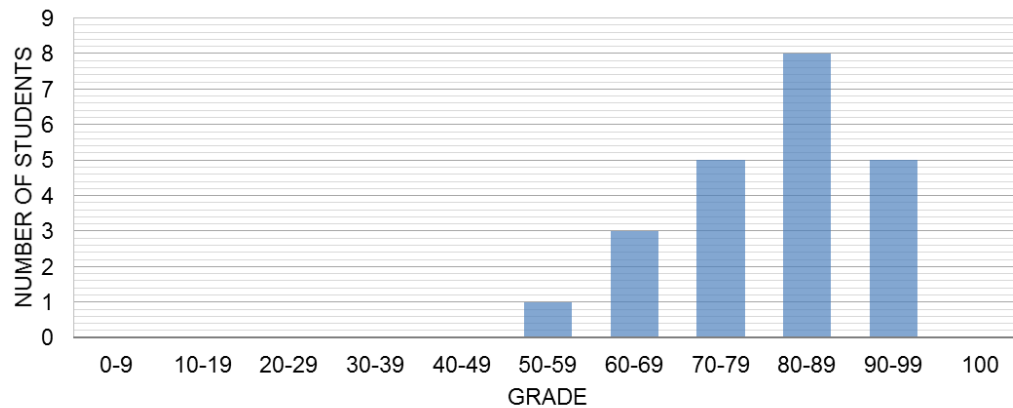
Grade distribution per problem
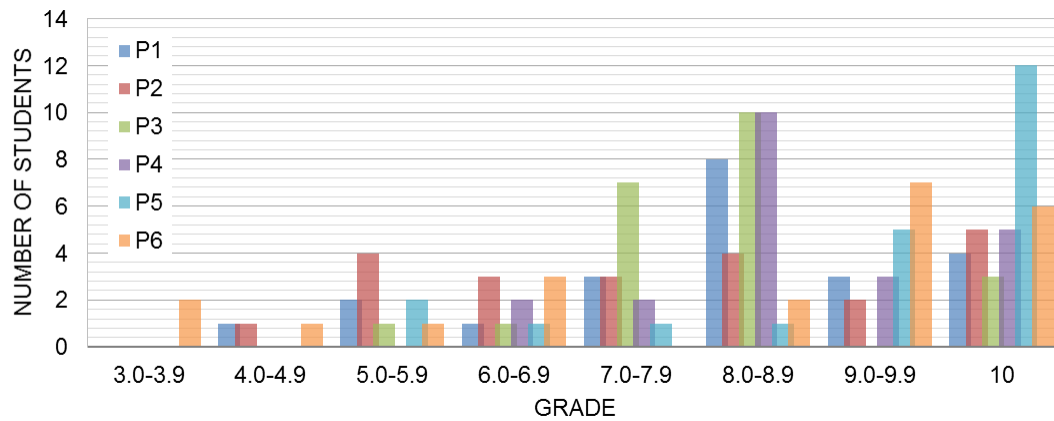
Comparison with past years

EV = 78.76
SD = 2.81

Comparison of Exam1, Exam2, and Final average with past years

EV = 82.15
SD = 2.27

Comments

OVERALL

- All students followed the rules for the formula sheet.

PROBLEM 1

- Some students did not integrate continuity equation over y.
- Some students used equations did not use the momentum equation to get the force. Instead, they used equations from boundary layer theory and did not integrate over x.
- Some students when using the momentum equation to get the force did not squared $u(y)$.
- Some students using momentum equation to get the force did not integrate the momentum over y.

PROBLEM 2

- Few students did not make correct assumptions when reducing the governing equation.
- Some students integrated reduced governing equation obtained from (a) to get the C_1 and C_2 by comparing with the given $u(y)$ equation.
- Some students did not make correct assumption for boundary conditions.

PROBLEM 3

- Some students did not apply the balance of forces on the sphere ($W = B + D$).
- Many students, when applying the balance of forces, did not include the buoyancy.
- Few students did not check the Re to confirm laminar/turbulent conditions.
- Some students made mistakes in calculating the prototype velocity from the Re similarity or did not calculate it at all.
- Some students did not impose constant drag coefficient between model and prototype for calculating the drag.

PROBLEM 4

- Some students did not apply the energy equation to determine the velocity in part (a).
- Few students that applied the energy equation did not simplify it correctly.
- Many students wrote down the continuity equation but made mistakes in deriving the other two equations needed for the system, namely, the head loss along the A-B branch and the head loss along the A-C branch (deriving from the energy equation).

PROBLEM 5

- Some students did not properly re-arrange the C_f equation to get the velocity U.
- Some students did not calculate D or used a wrong area when calculating the D force from C_D.

PROBLEM 6

- Some students did not add up the stream functions for the two basic flows.
- Some students did not calculate the velocity components to set as zero at the stagnation point.
- Some students used wrong values for applying stagnation point.