

# Vv256 Honors Calculus IV

## 1 Introduction

### 1.1 Course Profile

- **Instructor:**

Jing Liu

- **Lectures:**

Monday (16:00 – 17:40) in **F-315** Odd weeks only  
Tuesday (10:00 – 11:40) in **F-315**  
Thursday (10:00 – 11.40) in **F-215**

- **Office Hours:**

Monday (10:10 – 15:30) in **J1-Building 204** or by appointment.

- **Email:**

`stephen.liu@sjtu.edu.cn`

- **Teaching Assistant/s:**

See Canvas for his/her contact information

#### 1.1.1 Grading Policy

- **Assignment:**

25% Assignments will be given in the form of problem sets, and may require extra reading and the use of Matlab. Assignments will have bonus questions. Solutions to the bonus questions will not be provided. Bonus points obtained from an assignment can only be credited to **that** assignment. Assignments need to be submitted to the **correct** Vv256 pigeon-hole according to your student I.D. in the J1-building before the **beginning** of class on the day indicated on the assignment. Assignments also need to be submitted **online** through Canvas. Please plan your time accordingly, late assignment will be severely penalised.

- **Exam:**

|     |                            |           |            |       |
|-----|----------------------------|-----------|------------|-------|
| 75% | There will be three exams: | Midterm I | Midterm II | Final |
|     |                            | 25%       | 25 %       | 25 %  |

- For this course, the grade will be curved to achieve a median grade of “B<sup>+</sup>”.
- Further 1% bonus may be given for “class participation”, or demonstrating extraordinary effort in learning when 1% is all you needed to have a better grade. This bonus cannot be used to obtain “A<sup>+</sup>”.

## 1.1.2 Textbook and Syllabus

- [Textbook:](#)

Elementary Differential Equations and Boundary Value Problems  
William E.Boyce & Richard C.DiPrima (10th edition)

| Week                   | Topics                                      | Textbook Sections    |
|------------------------|---|----------------------|
| 1                      | Introduction                                | Ch-1;                |
|                        | Linear and Separable                        | Ch-2.1 ~ 2.4;        |
|                        | Autonomous                                  | Ch-2.5;              |
| 2                      | Exact                                       | Ch-2.6;              |
|                        | Constant coefficients                       | Ch-3.1;              |
| 3                      | Abel's theorem                              | Ch-3.2 ~ 3.4;        |
|                        | Nonhomogeneous                              | Ch-3.5 ~ 3.6;        |
|                        | Vibrations (optional)                       | Ch-3.7 ~ 3.8;        |
| 4                      | <b>Mid-Autumn Festival and National day</b> |                      |
| <b>Midterm Exam I</b>  |   |                      |
| 5                      | Higher order Linear Equations               | Ch-4;                |
|                        | Series Solutions                            | Ch-5.1               |
| 6                      | Ordinary                                    | Ch-5.2 ~ 5.3;        |
|                        | Regular singular                            | Ch-5.4 ~ 5.6         |
| 7                      | Euler and Bessel                            | Ch-5.7               |
|                        | Laplace Transform                           | Ch-6.1;              |
| 8                      | Derivatives and Inverses                    | Ch-6.2;              |
|                        | Translations                                | Ch-6.3 ~ 6.4;        |
| 9                      | Impulse functions and Convolution           | Ch-6.5 ~ 6.6;        |
|                        | Green's functions (optional)                | Lecture slides only; |
| <b>Midterm Exam II</b> |   |                      |
| 10                     | Vector Space                                | Lecture slides only; |
|                        | Eigenvalues and Eigenvectors                | Ch-7.3;              |
| 11                     | System of Differential equations            | Ch-7.4 ~ 7.5;        |
|                        | Complex System                              | Ch-7.6 ~ 7.7;        |
|                        | Phase planes                                | Ch-9.1;              |
| 12                     | Inner product space                         | Lecture slides only; |
|                        | Fourier series                              | Ch-10.2 ~ 10.4       |
| 13                     | Boundary value Problems                     | Ch-10.1              |
|                        | Separation of variables                     | Ch-10.5              |
|                        | Fourier transform (optional)                | Lecture sides only   |
| 14                     | <b>Final Exam</b>                           |                      |

### 1.1.3 Matlab

- Students are strongly encouraged to get acquainted with a computer algebra system and use it to experiment with the topics discussed in the class. Free software for both symbolic and numerical calculations (e.g. Maxima, Octave) are available, along with commercial tools such as [Matlab](#) .

- What is Matlab?

It is a software used by millions of engineers and scientists.

- What does it do?

It is designed to help you solve equations and manipulate expressions with minimal programming. It is particularly good at doing matrix operations.

- How to get Matlab

Matlab is installed on all computers in the JI Computer Lab.

You can also install Matlab on your own computer.

1. Register your name at [MathWorks](#) using your sjtu email
2. Download
3. Activate

Detailed instructions can be found at [JI's IT-page](#) .

### 1.1.4 Honour Code

- Honesty and trust are important. Students are responsible for familiarising themselves with what is considered as a violation of honour code.
- Assignments/projects are to be solved by each student individually. You are encouraged to **discuss** problems with other students, but you are advised **not to show your written work** to others. Copying someone else's work is a very serious violation of the honour code.
- Students may read resources on the Internet, such as articles on Wikipedia, Wolfram MathWorld or any other forums, but you are **not allowed** to post the original assignment question online and ask for answers. It is regarded as a violation of the honour code.
- Since it is impossible to list all conceivable instance of honour code violations, the students has the responsibility to always act in a professional manner and to seek clarification from appropriate sources if their or another students conduct is suspected to be in conflict with the intended spirit of the honour code.