课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**高等地球电磁学 (Advanced Geo Electromagnetism)**
2.	**课程性质** **Compulsory/Elective**	专业选修课 （specialized elective course）
3.	**课程学分/学时** **Course Credit/Hours**	3/48
4.	**授课语言** **Teaching Language**	中英双语
5.	**授课教师 Instructor(s)**	林玉峰
6.	**先修要求** **Pre-requisites**	微积分，数学物理方法，电磁学基础 Calculus, Mathematical Methods, Electromagnetism

7. 教学目标 Course Objectives

本课程为地球物理学等相关专业研究生的选修课。地球物理学以对地球介质中的各种物理场特征的研究为基础，其中电磁场是地球物理中广泛应用的方法之一。本课程主要讲述电磁场在地球介质中传播和分布的理论基础以及电磁方法在地球物理学中的主要应用。通过本课程，学生将掌握以下内容：

（1） 地球电磁场基本理论及地球介质中的电磁场分布；
（2） 全球电磁感应模型及应用电磁感应推断全球电导率分布；
（3） 地磁起源理论及全球地磁参考模型；
（4） 电磁方法在地震机理研究及地震监测中的应用。

This is a specialized course for graduate students in Geophysics and other related areas. Geophysics is based on studying different physical fields within the Earth's interior. One of the widely used fields in Geophysics is the electromagnetic field. This course aims to introduce essential principles of the propagation of electromagnetic fields within the Earth's interior and major applications of the electromagnetic methods in Geophysics. Upon completing this course, students should be able to grasp the following contents:

(1) Fundamental theory of geo-electromagnetic field in the Earth;
(2) Global EM induction model and global electric conductivity model;
(3) Origin of the Earth's magnetic field and reference models of geomagnetic fields;
(4) EM methods in earthquake studies.

8. 教学方法 Teaching Methods

课堂讲授 (Lecturing)

9. 教学内容 Course Contents

Section 1	课程简介及场论基础 Introduction to the course and the field theory (Week 1)
Section 2	地球物理电磁方法简介 Introduction to Geophysical electromagnetic methods (Week 2)
Section 3	电磁场方程 Electromagnetic field equations (Week 3)
Section 4	均匀大地中的电磁场 Electromagnetic fields in a uniform media (Week 4-5)
Section 5	水平层状介质中的电磁场 Electromagnetic fields in horizontally stratified media (Week 6-7)
Section 6	非均匀介质中的电磁场 Electromagnetic fields in inhomogeneous media (Week 8-9)
Section 7	全球电磁感应模型和全球电导率模型 Global EM induction and conductivity model (week 10-12)
Section 8	地磁场起源及全球地磁参考模型 Origin of the Earth's magnetic field and Geomagnetic reference model (week 13-15)

	Section 9	地震电磁研究 EM methods in Earthquake studies (week 16)

10. 课程考核 Course Assessment

平时作业(60%)和期末报告(40%)。期末报告需完成一个与课程内容相关的小课题，并写成报告。
The assessment will be based on homework assignments (60%) and a final report (40%). Students need to work on a small research project related to the course and write up a report based on research work.

11. 教材及其它参考资料 Textbook and Supplementary Readings

Zhdanov M. S, 2018, Foundations of Geophysical Electromagnetic Theory and Methods (second edition), Elsevier.
Backus, G., Parker R. & Constable C., 2015, Foundations of geomagnetism, Cambridge University Press.