

NST – PART IB EARTH SCIENCES B – 2017-2018

LECTURE LIST

Lectures are held in the Tilley Lecture Theatre, Department of Earth Sciences, at 9 am on Mondays, Wednesdays and Fridays, **starting Friday 6 October**. **Practicals** are generally designed so that they can be completed in around 90 minutes. These follow the course closely, with the exception of a series of occasional **map practicals** that are self-contained, and which are designed to introduce you to the art of geological map interpretation. The course also includes a two-week field trip at Easter that will take place in Cornwall, Dorset and Devon from **3rd to 13 April 2018**.

Michaelmas Term

In the beginning (*Helen Williams*)

1. Introduction to Earth's interior
2. The Big Bang, condensation, accretion and the formation of the planets
3. Introduction to isotopic systems
4. The age of the Earth

Crystallography and optical petrography (*Ian Farnan*)

5. Essential Crystallography I: Symmetry at the mm scale
6. Essential Crystallography II: Symmetry at the Å scale
7. Optics theory and practice I: Parallel light Microscopy
8. Optics theory and practice II: Convergent beam Microscopy

Principles of mineral behaviour (*Michael Carpenter*)

9. Displacive and reconstructive phase transitions: Silica minerals
10. Displacive and reconstructive phase transitions: Introductory thermodynamics
11. Solid solutions and binary phase diagrams I: Olivine minerals
12. Solid solutions and binary phase diagrams II: Crystallisation, melting and exsolution
13. Phase transitions and exsolution phenomena in pyroxenes I: Structure & crystal chemistry
14. Phase transitions and exsolution phenomena in pyroxenes II: Microstructures & cooling rates
15. Phase transitions and exsolution phenomena in feldspars I: Alkali feldspars
16. Phase transitions and exsolution phenomena in feldspars II: Plagioclase feldspars

Introductory igneous petrology (*Marie Edmonds*)

17. Introduction to igneous petrology; rock classification and nomenclature
18. Ternary phase diagrams I: principles
19. Ternary phase diagrams II: applications to real systems
20. Crystallisation of magmas
21. Physical volcanology

Chemical differentiation of the Earth (*Helen Williams*)

22. Earth's internal structure and composition
23. Chemical evolution of the Earth
24. Isotopic evolution of the crust and mantle.

Lent Term

Magmatic settings (*Sally Gibson*)

25. Magmatic settings I: Constructive plate margins: ophiolites
26. Magmatic settings II: Constructive plate margins: melting models
27. Magmatic settings III: Oceanic intraplate magmatism: Hawaii
28. Magmatic settings IV: Continental plumes and rifts
29. Magmatic settings V: Destructive plate margin magmatism
30. Global geodynamics and magmatism

Metamorphic mineralogy (*Michael Carpenter*)

31. Amphiboles
32. Sheet silicates
33. Cordierite, staurolite etc.
34. Aluminosilicates
35. Metastability and reaction kinetics: the Al_2SiO_5 system.

Introduction to metamorphism (*Tim Holland*)

36. Tectonic setting and controls on metamorphism
37. Metamorphism of pelites I: introductions and Barrow's zones
38. Metamorphism of pelites II: Reactions and projections
39. Trois Seigneurs I
40. Trois Seigneurs II
41. High temperatures and melting - granite production and migration
42. Texture and microstructure in metamorphic rocks
43. Geothermobarometry

Metabasites (*Marian Holness*)

44. Relative and absolute dating of metamorphic rocks
45. Metabasite facies I: the greenschist-amphibolite transition
46. Metabasite facies II: granulites
47. Metabasite facies III: eclogites
48. Metabasite facies IV: blueschists

Additional class: Introduction to GIS course, Lecture is at 10am in the Tilley on Wednesday 14 March 2018, followed by practicals Wednesday 11am-1pm, 2-4pm, and Thursday 10am-1pm.

Easter Term

Evolution of the Himalayas (*Ed Tipper*)

- 49. Geology and Tectonics of Asia
- 50. Metamorphism I
- 51. Metamorphism II
- 52. Thermal modelling
- 53. Large-scale deformation

Igneous Case studies (*John Maclennan*)

- 54. Magma chamber processes at destructive plate margins: Mt Mazama & Crater Lake
- 55. Timescales of volcanic activity at destructive plate margins: Mt St Helens
- 56. Mantle plumes and mafic volcanism in CFB provinces: The British Tertiary Volcanic Province
- 57. Granite genesis in CFB provinces: The British Tertiary Volcanic Province