

School of Mathematics

Module MA3412 — Abstract Algebra II

2011-12

(JS & SS Mathematics, JS & SS Two-subject Moderatorship)

Lecturer: Dr. David Wilkins**Requirements/prerequisites:** prerequisite: MA2215 or MA3411**Duration:** Hilary term, 10 weeks**Number of lectures per week:** 3 lectures per week**Assessment:****ECTS credits:** 5

End-of-year Examination: This module will be examined jointly with MA3411 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 2 hour examination.

Description:

Further detailed information about the course:

<http://www.maths.tcd.ie/~dwilkins/Courses/MA3412/>

Factorization in Integral Domains. Principal Ideal Domains.

Basic properties of modules over unital commutative rings. Noetherian modules. Noetherian rings. Hilbert's Basis Theorem.

Linear independence and free modules. Free modules over integral domains. Torsion modules. Free modules of finite rank over principal ideal domains. Torsion-free modules. The classification theorem for finitely-generated modules over principal ideal domains. The Jordan Normal Form.

Algebraic numbers and algebraic integers.

Textbooks:

1. B. Hartley and T.O. Hawkes, Rings, Modules and Linear Algebra, Third Edition, Chapman and Hall. London, 1970.

Learning Outcomes: On successful completion of this module, students will be able to:

- justify with reasoned logical argument basic properties of Noetherian modules and finite field extensions
- justify with reasoned logical argument results concerning the structure of finitely-generated modules over integral domains and principal ideal domains
- describe and justify with reasoned logical argument basic properties of algebraic integers