MA1212 – General information

- **Lecturer:** Paschalis Karageorgis (pete@maths.tcd.ie).
- **Web page:** http://www.maths.tcd.ie/∼pete/ma1212
- **Homework:** Assignments will be posted online each Thursday and they will be due a week later. No late homework will be accepted.
- **Tutorials:** They will take place during weeks 2, 4, 6, 9, 11 and 12. Maths: Wed at 3pm in McNeill. TP and TSM: Tue at 5pm in Joly.
- **Reading:** Brief notes and class notes will be posted online. If you need some additional references, then you may always consult
  - *Algebra* by Michael Artin,
  - *Matrix theory: a second course* by James Ortega,
  - *Elementary linear algebra with applications* by Anton and Rorres.
- **Marking policy:** 80% annual exam and 20% homework. The exam problems will be similar to the homework and tutorial problems.
- **Module structure:** We will be studying three main topics, namely diagonalisation, Jordan forms and bilinear forms.

MA1212 – Main concepts

The main concepts to be introduced in this module are the following.

1. **Diagonalisation:** recursive relations, diagonalisable, eigenvalues, eigenvectors, characteristic polynomial, null space, nullity.
2. **Jordan forms:** generalised eigenvectors, column space, rank, direct sum, invariant subspace, Jordan chain, Jordan block, Jordan form, Jordan basis, similar matrices, minimal polynomial.
3. **Bilinear forms:** bilinear form, matrix of a bilinear form, positive definite, symmetric, inner product, orthogonal/orthonormal basis, orthogonal matrix, quadratic form, signature, Sylvester's criterion.

MA1212 – Learning outcomes

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

- find an explicit basis for the null space of a given matrix;
- solve linear recursive relations involving two or more terms;
- apply standard techniques to obtain the Jordan form and a Jordan basis for a given complex square matrix;
- compute the matrix of a bilinear form with respect to a given basis;
- apply various methods (completing the square, Sylvester's criterion, eigenvalues) to find the signature of a symmetric bilinear form;
- combine various results established in the module to either prove or disprove statements involving concepts introduced in the module.