Module title: Topics in Nonlinear Analysis

Lecturer: Dr Hamid Baghani

Module Subjects:

Linear Spaces

1$^{\text{th}}$ **week:** Linear spaces, Normed spaces, Metric spaces

2$^{\text{th}}$ **week:** Convergence, Banach spaces, Completion of normed spaces

3$^{\text{th}}$ **week:** Inner product spaces, Orthogonality

4$^{\text{th}}$ **week:** Spaces of continuously differentiable functions, Holder spaces, L_P spaces, Compact sets

Elementary Fixed Point Theorems

5$^{\text{th}}$ **week:** Results Based on Completeness

6$^{\text{th}}$ -7$^{\text{th}}$ **weeks:** Order-Theoretic Results

8$^{\text{th}}$ -9$^{\text{th}}$ **weeks:** Results Based on Convexity

10$^{\text{th}}$ -11$^{\text{th}}$ **weeks:** Further Results and Applications

Theorem of Borsuk and Topological Transversality

12$^{\text{th}}$ **week:** Theorems of Brouwer and Borsuk

13$^{\text{th}}$ -14$^{\text{th}}$**weeks:** Fixed Points for Compact Maps in Normed Linear Spaces

15$^{\text{th}}$ **weak:** Compact and Completely Continuous Operators

16$^{\text{th}}$ **weak:** Equation x = F(x). The Leray- Schauder Principle and Birkhoff- Kellogg Theorem.