Using Social Network Analysis and Research Collaboration Data to Identify Patterns of Faculty Influence

NJIT New Jersey's Science & Technology University

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Gender Composition of Professors and Distinguished Professors in Science, Technology, Engineering, and Math as of 2010 (M = 116, F = 9)

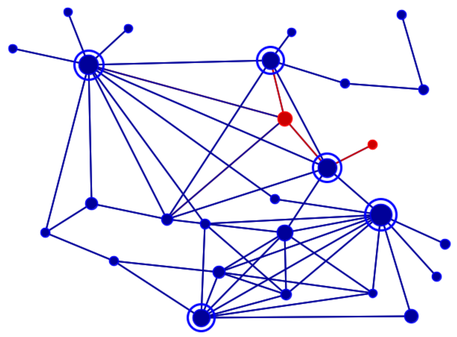

Fig. 1: Network of the top 5 faculty members, by gender. All top 5 are male; of their co-authors, only 2 (in red) are women. Node size represents total degree centrality in the co-authorship network

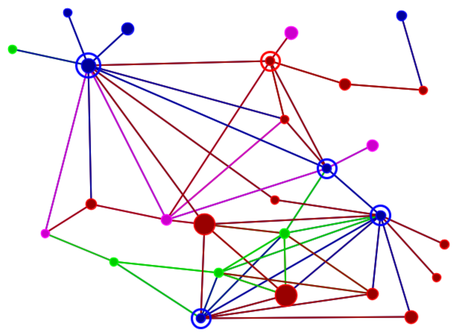

Fig 2: Network of the top 5 faculty members, by rank. Four of the top 5 are Distinguished Professors; the fifth is a Professor. Node size indicates betweenness centrality in the co-authorship network

Distinguished Professor
Professor
Associate Professor
Assistant Professor

Rank Creates Influence

At NJIT, only faculty who have attained the rank of **Professor** or **Distinguished Professor** are eligible to serve on the departmental and institute promotion and tenure committees that decide the career fate of younger colleagues and vet prospective hires—thus shaping institutional research directions and collegial climate.

Network Centrality Creates Influence

Faculty with high **Total Degree Centrality** are "players" who can directly reach many people in the network.

Faculty with high **Betweenness Centrality** can broker the flow of information in the network.

Faculty with high **Eigenvector Centrality** (i.e. who are connected to well-connected people) can spread information more quickly.

Methodology

Researchers text-mined Google Scholar and Scopus, collecting 8395 faculty publications produced by 514 faculty from 2000 to 2010. Co-authored publications were used to create a faculty network that was analyzed using UCINET and ORA.

Top 5 Faculty Members

Researchers used ORA to identify faculty who were consistently in the top five in terms of various network centrality measures. Attribute data of these faculty was further analyzed to identify factors contributing to their success, as well as to explore gender disparities.

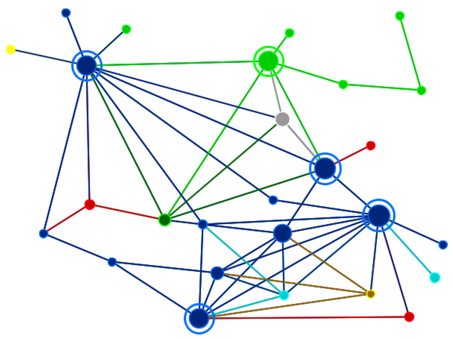

Fig. 3: Network of the top 5 faculty members by department. Four of the top 5 are in the Physics department; the fifth is in the Chemical Engineering department. Node size represents Eigenvector centrality in the co-authorship network

Biomedical
Chemical
Civil
Computer Science
Electrical
Engineering Technology
Industrial/Manuf.
Information Systems
Mathematics
Mechanical
Physics

Correlation Between Two Measures of Influence: Rank and Network Centrality

Using the UCINET ANOVA test, researchers have established that faculty rank is positively correlated with network centrality measures in the NJIT co-authorship network.

Rank and Co-authorship Betweenness Centrality	$F = 2.9449$, $p = 0.0292$ $r2 = 0.036$
Rank and Co-authorship Eigenvector Centrality	$F = 7.1885$, $p = 0.0014$ $r^2 = 0.084$
Rank and Co-authorship Total Degree Centrality	$F = 14.7928$, $p = 0.0002$ $r^2 = 0.159$