

## Course Syllabus

### RISK MANAGEMENT

*For Chartered Financial Analyst (CFA) Program*

Henry Penikas

#### 1) Course Abstract

Course is intended to provide the deep understanding of approaches used for risk management in financial institutions. The risk management process is described in detail. Recent regulatory developments are covered. The material would help to prepare for the Level III part of CFA exam.

#### 2) Evaluation criteria

$$\text{FinalScore} = 0.6 \cdot \text{ExamScore} + 0.3 \cdot \text{InterimTestsScore} + 0.1 \cdot \text{ColloquiumScore}$$

Colloquium is the discussion of the students understanding of current trends in risk-management and risk regulation based on the following paper of Professor Stiglitz:

*Stiglitz J. (2008): "Testimony before the House Committee on Financial Services". URL: [http://www2.gsb.columbia.edu/faculty/jstiglitz/download/Oct2008\\_HouseFinancialServices.pdf](http://www2.gsb.columbia.edu/faculty/jstiglitz/download/Oct2008_HouseFinancialServices.pdf)*

#### 3) Course Content

1. Introduction to Risk Theory
  - Risk perception (risk-lovers; risk-averse); Newman-Morgenstern utility function; Arrow-Pratt coefficient; absolute/relative risk perception;
    - [53]
2. Risk Identification
  - Risk map; risk self-assessment
    - [1]
3. Risk Measures
  - Assumptions; parametric, non-parametric; Parametric (standard-deviation; delta- and gamma-normal approach); non-parametric (historical; Monte-Carlo-based); Value-at-Risk; Expected Shortfall; Distortion risk measure; spectral risk measure;
    - [48]
4. Definition of derivatives
  - Derivative types (FRA; futures; options; caps; collars; interest rate; foreign exchange; cross-currency; equity; commodity swaps; total return swap; cash-settlement, non-cash-settlement; hedging, trading); Fair value of the derivatives; Derivatives evolution (BIS statistics; EU banks data);
    - [9]; [43]

5. Brief history of banking regulation
  - Groupe de contact; Basel Committee; Basel I, Basel II, Basel III; Basel vs. IFRS regulation;
    - [17]; [44]
6. Basel II Pillar I requirements
  - Basel II structure; credit, market, operational risks; Definition of trading and banking books; Capital adequacy ratio (CAR); Capital definition (core tier 1, tier 1, tier 2); Subordinated debt, CoCos, loss absorbency;
    - [1]; [41]
7. Design of IRRS
  - Internal risk rating system (IRRS) design; Default definition; Master scale; Rating philosophy (point-in-time; through the cycle);
    - [50]
8. Credit risk probability of default (PD) modeling
  - Asset single risk-factor (ASRF) Vasicek model; Multiple risk-factor model of Pukhtin; Low default portfolio (LDP) modeling; Dead-weight loss (DWL) from IRB models; use of public credit registries;
    - [58]; [55]; [42]
9. Credit risk loss given default (LGD) modeling
  - Market-based LGD; Discounted workout recoveries cashflow-based LGD; Downturn LGD;
    - [42]; [50]
10. Credit risk exposure at default (EAD) modeling
  - Securities financing transactions (SFT); Expected positive exposure; Downturn EAD;
    - [42]; [50]
11. Credit risk RWA estimation
  - Credit risk exposure to central counterparties; Double default framework;
    - [1]; [8]; [11]
12. Credit risk mitigation (CRM) techniques
  - Haircut definition; hedging; efficient hedging;
    - [1]
13. Credit Risk valuation adjustment
  - Credit risk valuation adjustment; Debit risk valuation adjustment;
    - [4]; [31]
14. Credit risk for structured products
  - Securitization framework; Credit exposure on purchased protection (CDS);
    - [13]; [29]
15. Market risk measurement
  - Price, foreign exchange, interest rate risks;
  - Market liquidity risk;
  - (Pre-)settlement risk;
  - Standardized approach; internal models method;
    - [1]; [10]; [15]; [16]
16. Operational risk measurement

- Risk categories and risk events;
  - Basic indicator approach; standard, alternative standard and advanced measurement approach;
  - Use of internal and external data;
    - [1]; [3]
17. Liquidity risk measurement
- Liquidity coverage ratio (LCR);
  - Net stable funding ratio (NSFR);
  - Intraday liquidity management;
    - [5]; [7]; [12]
18. Validation procedure
- Models, systems, process validation;
  - ROC-curve; accuracy ratio; Kupiec and Christopherson tests; Risk-measure breach; loss function;
    - [1]; [50]
19. Basel II Pillar II requirements
- Internal capital adequacy assessment process (ICAAP); Supervisory review and evaluation process (SREP); Pillar II capital buffer (economic capital);
    - [1]; [18]
20. Proportionality and systemical importance
- Proportionality criteria for ICAAP; Systemically important financial institutions (SIFI): GSIB, GSII, DSIB; Capital buffer for systemical importance;
    - [1]; [18]; [24]; [33]; [54]
21. Concentration risk
- Capital requirements for large exposures; Gordy model for concentration capital charge;
    - [14]; [45]
22. Other risks measurement
- Interest rate risk in a banking book; Reputational risk; capital implication of liquidity risk;
    - [1]
23. Capital aggregation
- Approaches to economic capital aggregation: summation; simple diversification; variance-covariance; copulas; full imitational modeling; capital requirements for financial conglomerates;
    - [2]; [28]; [49]; [51]
24. Capital allocation
- Activity-based allocation; Beta method (variance-covariance approach); Incremental method; cost gap method; Shapley vector; Euler- (gradient-) method;
    - [39]
25. Stress-testing
- Stress-testing principles; sensitivity analysis; aggregate stress-testing; scenario analysis; reverse stress-testing;
    - [1]; [40]
26. Basel II Pillar III requirements

- IFRS notes to financial statements; Risk reporting; risk-appetite statement;
  - [1]; [22]; [36]
- 27. Leverage ratio
  - Leverage ratio; information disclosure on leverage ratio;
    - [4]
- 28. Basel III Capital buffers
  - Conservation buffer; Procyclicality problem; countercyclical capital buffer;
    - [4];
- 29. Corporate governance
  - Corporate governance principles; Risk vs. committee, committee vs. executives matrixes; Three lines of defense principle;
    - [31]; [37]
- 30. Risk-reward alignment
  - Remuneration regulation; Deferral rule, optimal incentive contract;
    - [6]; [35]; [52]
- 31. Loan pricing
  - Loan pricing based on economic capital consumption;
    - [47]
- 32. Limit setting
  - Position and stressed limits
    - [56]
- 33. Risk-adjusted performance
  - Risk-adjusted return on capital (RAROC); own default probability; Sharpe ratio; Sortino ratio; return over maximum drawdown;
    - [48]
- 34. Risk budgeting and recovery planning
  - Risk management alignment to financial institution strategy; Recovery plan template;
    - [19]; [20]

#### 4) **References:**

##### **Documents**

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- [3] Basel Committee on Banking Supervision (2009): Results from the 2008 Loss Data Collection Exercise for Operational Risk. URL: <http://www.bis.org/publ/bcbs160a.pdf>
- [4] Basel Committee on Banking Supervision (2010): Basel III: A global regulatory framework for more resilient banks and banking systems. URL: <http://www.bis.org/publ/bcbs189.pdf>

- [5] Basel Committee on Banking Supervision (2010): Basel III: International framework for liquidity risk measurement, standards and monitoring. URL: <http://www.bis.org/publ/bcbs188.pdf>
- [6] Basel Committee on Banking Supervision (2011): Range of methodologies for risk and performance alignment of remuneration - final document. URL: <http://www.bis.org/publ/bcbs194.htm>
- [7] Basel Committee on Banking Supervision (2012): Monitoring indicators for intraday liquidity management. URL: <http://www.bis.org/publ/bcbs225.htm>
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- [9] Basel Committee on Banking Supervision (2013): Derivatives statistics. URL: <http://www.bis.org/statistics/derstats.htm>
- [10] Basel Committee on Banking Supervision (2013): Fundamental review of the trading book - second consultative document. URL: <http://www.bis.org/publ/bcbs265.htm>
- [11] Basel Committee on Banking Supervision (2013): Margin requirements for non-centrally cleared derivatives - final document. URL: <http://www.bis.org/publ/bcbs261.htm>
- [12] Basel Committee on Banking Supervision (2013): Monitoring tools for intraday liquidity management - final document. URL: <http://www.bis.org/publ/bcbs248.htm>
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- [14] Basel Committee on Banking Supervision (2013): Supervisory framework for measuring and controlling large exposures - consultative document. URL: <http://www.bis.org/publ/bcbs246.htm>
- [15] Basel Committee on Banking Supervision (2013): Supervisory guidance for managing risks associated with the settlement of foreign exchange transactions. URL: <http://www.bis.org/publ/bcbs241.htm>
- [16] Basel Committee on Banking Supervision (2013): The non-internal model method for capitalising counterparty credit risk exposures - consultative document. URL: <http://www.bis.org/publ/bcbs254.htm>
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- [18] Financial Conduct Authority (2013): “Prudential sourcebook for Banks, Building Societies and Investment Firms (BIPRU)”. URL: <http://media.fshandbook.info/content/full/BIPRU.pdf>
- [19] European Banking Authority (2013): Recommendation on the development of recovery plans (EBA/REC/2013/02). URL: [http://www.eba.europa.eu/documents/10180/105413/EBA\\_Recommendation-on-Recovery-Plans.pdf](http://www.eba.europa.eu/documents/10180/105413/EBA_Recommendation-on-Recovery-Plans.pdf)
- [20] Federal Reserve. Resolution Plans. URL: <http://www.federalreserve.gov/bankinforeg/resolution-plans.htm>

- [21] Financial Stability Board (2013): Principles for An Effective Risk Appetite Framework. Consultative Document. URL: [http://www.financialstabilityboard.org/publications/r\\_130717.pdf](http://www.financialstabilityboard.org/publications/r_130717.pdf)

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### **Research Papers and Books**

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## 5) Suggested Timing

No.	Area	Topic	Hours	Day
1	Introduction	Introduction to Risk Theory	0,25	1
2	Introduction	Risk Identification	0,25	1
3	Introduction	Risk Measures	0,50	1
4	Introduction	Definition of derivatives	0,50	1
5	Introduction	Brief history of banking regulation	0,50	1
6	Credit Risk	Basel II Pillar I requirements	0,50	1
7	Credit Risk	Design of IRRS	0,50	1
8	Credit Risk	Credit risk probability of default (PD) modeling	1,50	1
9	Credit Risk	Credit risk loss given default (LGD) modeling	0,75	1
10	Credit Risk	Credit risk exposure at default (EAD) modeling	0,75	1
11	Credit Risk	Credit risk RWA estimation	0,50	2
12	Credit Risk	Credit risk mitigation (CRM) techniques	0,50	2
13	Credit Risk	Credit Risk valuation adjustment	0,50	2
14	Credit Risk	Credit risk for structured products	1,00	2
15	Market Risk	Market risk measurement	1,50	2
16	Operational Risk	Operational risk measurement	1,00	2
17	Liquidity Risk	Liquidity risk measurement	1,00	2
18	Validation	Validation procedure	0,50	2
19	ICAAP	Basel II Pillar II requirements	0,50	2
20	ICAAP	Proportionality and systemical importance	1,00	2
21	ICAAP	Concentration risk	1,50	3
22	ICAAP	Other risks measurement	1,00	3
23	ICAAP	Capital aggregation	1,00	3
24	ICAAP	Capital allocation	1,00	3
25	ICAAP	Stress-testing	1,50	3
26	Pillar III	Basel II Pillar III requirements	1,00	4
27	Basel III	Leverage ratio	0,50	4
28	Basel III	Basel III Capital buffers	0,50	4
29	Basel III	Corporate governance	0,50	4
30	Basel III	Risk-reward alignment	1,00	4
31	Applications	Loan pricing	1,00	4
32	Applications	Limit setting	0,50	4
33	Applications	Risk-adjusted performance	0,50	4
34	Applications	Risk budgeting and recovery planning	0,50	4
35	Examination	Examination	4,00	5
<b>Total</b>			<b>30,00</b>	