

## Overview

### 1. Personal data

#### Full Name

Maria Luísa Martins Macedo de Faria Mascarenhas

#### Fiscal ID number

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#### ID document

1220326

#### Birth date

29-10-1950

#### National of

Portugal

#### Gender

F

#### Work address

Universidade Nova de Lisboa e C.M.A./U.N.L.  
Quinta da Torre  
2825-114 Caparica  
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#### Residential Address

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### 2. Academic degrees

**Year:** 2000

**Degree:** AGREGAÇÃO

**Final grade:** Aprovada por unanimidade

**Degree granting institution** Faculdade de Ciências da Universidade de Lisboa

**School/College/Campus** n/a

**Thesis title**

**Supervisor:**

**Co-supervisor:**

**Scientific area** Matemática

**Program title**

**Year:** 1983

**Degree:** DOUTORAMENTO EM MATEMÁTICA

**Final grade:** Distinção e louvor

**Degree granting institution** Faculdade de Ciências da Universidade de Lisboa

**School/College/Campus** n/a

**Thesis title**

**Supervisor:**

**Co-supervisor:**

**Scientific area**

**Number of curricular years** 0

**Program title**

**Year:** 1980

**Degree:** DOCTORAT TROISIEME CYCLE-MATHÉMATIQUES

**Final grade:** Approuvé

**Degree granting institution** Université de Paris XI, Orsay

**School/College/Campus** n/a

**Thesis title**

**Supervisor:**

**Co-supervisor:**

**Scientific area**

**Number of curricular years** 0

**Program title**

**Year:** 1973

**Degree:** LICENCIATURA EM MATEMÁTICA

**Final grade:** 18 (over 20)

**Degree granting institution** Faculdade de Ciências da Universidade de Lisboa

**School/College/Campus** n/a

**Thesis title**

**Supervisor:**

**Co-supervisor:**

**Scientific area**

**Number of curricular years** 0

**Program title**

### 3. Previous activity and current status

Period	Position, professional rank or activity	Institution
From October 1971 to October 1973	Monitora	Faculdade de Ciências da Universidade de Lisboa
From October 1973 to July 1983	Assistente	Faculdade de Ciências da Universidade de Lisboa
From July 1983 to March 1993	Professora Auxiliar	Faculdade de Ciências da

From March 1993 to April 2004	Professora Associada	Universidade de Lisboa Faculdade de Ciências da Universidade de Lisboa
From April 2004	Professora Catedrática	Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa

#### 4. Area of scientific activity

Mathematical Analysis.  
Nonlinear Partial Differential Equations from Continuum Mechanics.  
Applications.

#### 5. Present research interest

##### Domain of specialization

Homogenization.  
Calculus of Variations.

##### Current research interests

Homogenization theory and its applications to composite materials or to materials with highly oscillating properties in conductivity, in elasticity or in viscoelasticity. Dimension reduction problems in nonlinear elasticity and in conductivity.  
Calculus of Variations: necessary and sufficient conditions for weak lower semicontinuity. Relaxation and integral representation of functionals related to material discontinuities.

##### Other professional interests/activities

#### 6. Experience as scientific adviser

##### Mestrado thesis:

- 1) José Firmino Aguilár Madeira (co-supervisor L. Trabucho). FCUL, May 1995.
- 2) Anca-Maria Toader. FCUL, April 1995.
- 3) Ana Paula Vieira Maldonado (co-supervisor L. Trabucho).FCUL, September 1995.
- 4) Marília da Conceição Valente de Oliveira Pires (co-supervisor L. Trabucho). FCUL, December 1995.
- 5) Verónica Quítalo. FCUL, April 2002.
- 6) Rita Alexandra Gonçalves Ferreira. FCUL, Maio 2006.

##### PhD thesis:

- 1) Anca-Maria Toader. FCUL, October 2000.
- 2) Rita Alexandra Gonçalves Ferreira.

##### Post-doctors:

- 1) Rodica Toader, PhD S.I.S.S.A (Italy), from December 1997 to March 1999.
- 2) Rajesh Mahadevan, PhD I.S.I. (India), from January 2003 to June 2003.

#### 7. Participation in R&D projects

##### Participação em projectos de investigação (coordenador/membro de equipas)

Coordinator:

J.N.I.C.T., Nº 87 593 (co-responsability) Programa Mobilizador de Ciência e Tecnologia.  
Title: Aplicação dos Métodos de desenvolvimento Assimptótico e de Homogeneização no estudo de uma classe de problemas em Mecânica dos Sólidos.

Acção Integrada Luso - Espanhola, (F.C.U.L./ Univ. of Santiago de Compostela), (1990).

European project T.E.M.P.U.S. nº JEP - 2797/91.  
Title: Développement des Mathématiques Appliquées en Roumanie (1991 - 1993).

Project S.T.R.I.D.E. nº STRDA/P/CEN/536/92.  
Title: Soluções Generalizadas em Optimização de Forma Aplicada à Teoria da Elasticidade. (1992 - 1995).

Programa de Cooperação Científica e Técnica Luso-Francesa nº166/B2, M.E.N.R.T./I.C.C.T.I., (ANLA- Univ.Toulon /CMAF-UL).  
Title: Analyse Variationnelle Non Linéaire, Modelation Mécanique, (1996 - 2000).

GRICES/PESSOA (AICCT Luso-Francesa)  
Title: Análise Assimptótica em Mecânica (2005-2006).

POCI/MAT/60587/2004  
Title: Asymptotic Analysis applied to Continuum Mechanics (2005-2009).

PTDC/MAT/109973/2009  
Title: Optimization Methods in Continuum Mechanics (2011- ).

UTA\_CMU/MAT/0005/2009  
Title: Thin structures, homogenization and multi phase problems (2011- ).

Member of team:

European project nº ECC-SC1 0473-C(EDB),  
Title: Junctions in Elastic Multistructures.

European project nº ERB CHRXCT 940536,  
Title: Shells: Mathematical Modeling and Analysis, Scientific Computing.

Praxis nº Praxis/3/3.1/CTM/10/94.  
Title: Estudo e desenvolvimento de modelos matemáticos, mecânicos e computacionais, aplicados à análise do comportamento de estruturas do corpo humano.} (1995 - 1998).

Praxis nº Praxis/2/2.1/MAT/125/94,  
Title: Análise local e global das equações diferenciais. Fundamentos e aplicações (1996-1999).

POCTI/ISFL-1-209  
Title: Análise local e global das equações diferenciais. Fundamentos e aplicações (from 2000-2005).

European project nº HPRN-CT-2002-00284,  
Title: New Materials, Adaptative Systems and their Nonlinearities : Modeling, Control and Numerical Simulation (2002-2006).

**8. Prizes and awards received**

Year	Name of the prize or award	Promoting entity
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**9. Published works**

**Artigos em revistas de circulação internacional com arbitragem científica**

MASCARENHAS, M.L., Fonctionnelles faiblement continues et semi-continues inférieurement issues de lois de comportement non linéaires pour des fluids incompressibles. C.R. Acad. Sci. Paris, t 291, Série A (1980), pp. 79-81.

MASCARENHAS, M.L., A linear homogenization problem with time dependent coefficient. Trans. Amer. Math. Soc., vol. 281, nº 1 (1984), pp. 179-195.

MASCARENHAS, M.L., Homogenisation of a viscoelastic equation with non periodic coefficients. Proc. of the Roy. Soc. of Edinburgh, 106 A (1987), pp. 143-160.

MASCARENHAS, M.L. & L. TRABUCHO, Homogenized behavior of a beam with a multicellular cross section. App. Anal., vol. 38 (1990), pp. 97-119.

MASCARENHAS, M.L. & L. TRABUCHO, Homogenization and a Galerkin Approximation Method in three - dimensional beam theory. App. Anal., vol. 42 (1991), pp. 83-111.

MASCARENHAS, M.L., Gamma - limite d' une fonctionnelle liée à un phénomène de mémoire. C.R. Acad. Sci. Paris, t. 313, Série I (1991), pp. 67-70.

MASCARENHAS, M.L. & D. POLISEVSKI, Homogenization of the torsion problem with quasi-periodic structure. Numer. Funct. Anal.Optimiz., 13 (5& 6) (1992), pp. 475-486.

MASCARENHAS, M.L., Memory effect phenomena and Gamma - convergence. Proc. Roy. Soc. Edinburgh, 123 A (1993), pp. 311-322.

MASCARENHAS, M.L. & D. POLI SEVSKI, The warping, the torsion and the Neumann problems in a quasi - periodically perforated domain. R.A.I.R.O. Mathematical Modelling and Numerical Analysis, vol. 28 (1994), 1, pp. 37-57.

CHENAIS, D., M.L. MASCARENHAS & L. TRABUCHO, On Optimization of Non Periodic Homogenized Microstructures. R.A.I.R.O. Mathematical Modelling and Numerical Analysis, vol. 31, 5 (1997), pp. 559-597.

MASCARENHAS, M.L., Gamma - convergence and non local effects: a non linear case. Gakuto International Series, Mathematical Sciences and Applications, Homogenization and Application to Mathematical Sciences, vol. 9 (1997), pp. 279-290.

ENE, H.I., M.L. MASCARENHAS & J. SAIN JEAN PAULIN, Memory effects in elastic-viscoelastic composites. R.A.I.R.O. Mathematical Modelling and Numerical Analysis, vol. 31, 7 (1997), pp. 927-952.

BOUCHITTE, G., I. FONSECA & L. MASCARENHAS, A global method for relaxation. Arch. Rat. Mech. Anal., 145 (1998), pp. 51-98.

CIORANESCU, D., A. DAMLAMIAN, P. DONATO & L. MASCARENHAS, H<sup>0</sup>-convergence as a limit case of H-convergence. Advances in Math. Sciences and Appl., vol. 9, 1 (1999), pp. 319-331.

MASCARENHAS, M.L. & A.-M. TOADER, Scale Convergence in Homogenization. Numer. Funct. Anal. Optimiz., vol. 22, 1-2 (2001), pp. 127-158.

BOUCHITTE, G., I. FONSECA & L. MASCARENHAS, Relaxation of variational problems under trace constraints. Nonlinear Analysis, vol. 49, 2, Ser. A, pp. 221-246 (2002).

BOUCHITTE, G., I. FONSECA, G. LEONI & L. MASCARENHAS, A global method for relaxation in SBVp. Arch. Rat. Mech. Anal., 165 (2002), pp. 187-242.

BOUCHITTE, G., I. FONSECA & L. MASCARENHAS, Bending moment in Membrane Theory. Journal of Elasticity 73 (1-3) (2003), pp. 75-99.

BONDARENKO, A., G. BOUCHITTE, L. MASCARENHAS & M. RAJESH, Rate of convergence for correctors in almost periodic homogenization. Continuous and Discrete Dynamical Systems A, 13 (2) (2005), pp. 503-514.

BOUCHITTE, G., L. MASCARENHAS & L. TRABUCHO, On the curvature and torsion effects in one dimensional wave guides. ESAIM Control, Optimisation and Calculus of Variations 13 (2007), no. 4, pp. 793-808.

FERREIRA, R. & M.L. MASCARENHAS, Waves in a thin and periodically oscillating medium. C. R. Acad. Sci. Paris, Ser. I, 346 (2008) pp. 579-584.

BOUCHITTE, G., I. FONSECA & M. L. MASCARENHAS, The Cosserat vector in membrane theory: a variational approach, Journal of Convex Analysis, nº 2 (2009), pp.351-365.

FERREIRA, R., M.L. MASCARENHAS & A. PIATNITSKI, Spectral Analysis in a Thin Domain with Periodically Oscillating Characteristics, to appear in ESAIM Control, Optimisation and Calculus of Variations.

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#### **Publicações em actas de encontros científicos**

MASCARENHAS, M.L. & L. TRABUCHO, Uma justificação e generalização de teorias clássicas de flexão e de torção de vigas prismáticas de secção multicelular. Actas do IV Congresso Nacional de Mecânica Teórica e Aplicada, Coimbra 1987, D. X. Viegas ed., publicação 3.1.

MASCARENHAS, M.L., A result of homogenisation for a viscoelastic equation with non periodic coefficients. Lecture Notes in Pure and Applied Mathematics Differential Equations Xanthi 1997, Dafermos, C.M., G. Ladas & G. Papanicolaou eds. New York: Marcel Dekker, 1989, vol. 118, pp. 467-472.

MASCARENHAS, M.L. & L. TRABUCHO Asymptotic, homogenization and Galerkin methods in three - dimensional beam theory. Proc. IMACS 91, 13th World Congress on Computation and Applied Mathematics, Vichnevetsky and Miller eds., Dublin 1991, vol. 4, pp. 1911-1912.

MASCARENHAS, M.L. & L. TRABUCHO On the influence of the microstructure in the calculation of shear intensity factors. Proc. Asian Pacific Conference on Computational Mechanics (APCOM), Hong - Kong 1991, Ceung Y.K., J.H.W. Lee & A.Y.T. Leungeds eds., Rotterdam: Balkema 1991, pp. 135-141 .

MASCARENHAS, M.L. & L. TRABUCHO Asymptotic, homogenization and Galerkin methods in three - dimensional beam theory. Computational and Applied Mathematics, Ames, W.F. & P.J. Van der Honwen eds., Elsevier, North Holland 1992, II, pp. 85-91 .

MASCARENHAS, M.L. & D. POLISEVSKI, The warping and the torsion problems in a quasi-periodically perforated domain. Proc. Nato Advanced Research Workshop in Topology Design of Structures, Sesimbra 1992, M. Bendso e ed., Kluwer Academic Publishers, Netherlands, 1993, pp. 395-404.

MASCARENHAS, M.L., Homogenization Problems in Locally Periodic Perforated Domains. Proc. of the International Conference in Asymptotic Methods for Elastic Structures, Ciarlet, P.G., L. Trabucho & J. Viaño eds., Walter de Gruyter, Berlin - New York, 1995, pp.141-149.

CHENAIS, D., M.L. MASCARENHAS & L. TRABUCHO, Optimization of non periodic homogenized microstructure, Blum, J. & A. RAOULT eds. Esaim Proceedings. Elasticité, Viscoélasticité et Contrôle Optimal. Huitièmes Entretiens du Centre Jacques Cartier, 1 (1996), pp. 157-168.

CHENAIS, D., M.L. MASCARENHAS & L. TRABUCHO, Optimization of quasi-periodical perforated structures, Gakuto International Series, Mathematical Sciences and Applications, Homogenization and Application to Mathematical Sciences, vol. 9 (1997), pp. 113-122.

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#### **Outras publicações**

MASCARENHAS, M.L., Orientação de Variedades Topológicas , Faculdade de Ciências da Universidade de Lisboa (1973).

MASCARENHAS, M.L., Sur l'étude de lois de comportement non linéaires pour des fluides incompressibles – Thèse de Troisième Cycle, Université de Paris XI, Orsay (1980).

MASCARENHAS, M.L., Métodos de Análise não linear em problemas de Mecânica do Contínuo. PhD thesis, Universidade de Lisboa (1983).

MASCARENHAS, M.L. & L. TRABUCHO eds., Second Week on Asymptotic Analysis. Textos e Notas nº 43, CMAF(1990).

MASCARENHAS, M.L., Homogeneização, (course notes).

SANCHEZ, L. (collaboration of MASCARENHAS, M.L.), Iniciação ao Estudo das Funções Reais de Variável Real (10º Ano) (Projecto REANIMAT, 2001).

SANCHEZ, L. (collaboration of MASCARENHAS, M.L.), Resolução dos exercícios de Funções (10º Ano) (Projecto REANIMAT, 2001).

SANCHEZ, L. (collaboration of MASCARENHAS, M.L.), Iniciação ao Estudo das Funções Reais de Variável Real (11º Ano) (Projecto REANIMAT, 2002).

MASCARENHAS, L., Pequenas Escalas e Homogeneização, 2000 Matemática Radical, Textos de Matemática (DM-FCUL), vol. 16, (2002) pp. 197-209, eds. L. Trabucho, M. Ramos, J.N. Silva.

MASCARENHAS, L. & L. TRABUCHO, Análise do sistema de votação no Conselho da Europa (EU-25), F.C.U.L., Setembro de 2003.

## 10. Communications in scientific meetings

### Comunicações orais por convite

Comportement Asymptotique de poutres finement perforées  
Univ. of Pavia, May 1988.

Homogénéisation en viscoélasticité linéaire à coefficients non Périodiques  
Univ. La Sapienza, Rome, May 1988.

Memory effect phenomena and Gamma - convergence  
Junctions in Elastic Multistructures, E.S.I.E.E., Noisy le Grand, France  
December 1991.

Torsion and warping functions in a quasi periodic domain  
Center for Nonlinear Analysis, University of Carnegie Mellon, Pittsburgh, April 1992.

Homogenization problems in quasi-periodic perforated domains  
Saarbrücken Shuttle Seminar, Univ. des Saarlandes, November 1993.

Homogenization problems in locally periodic perforated domain.  
International conference on Asymptotic Methods for Elastic Structures,  
Estoril, Lisboa, October 1993.

Phénomènes de mémoire et homogénéisation  
Univ. de St. Etienne, November 1993.

Optimisation de la constante de torsion par rapport à la microstructure homogénéisée  
Univ. de Toulon et du Var, February 1995.

Effets de mémoire et Gamma convergence  
Univ. de Toulon et du Var, February 1995.

Optimisation de la constante de torsion par rapport à la microstructure homogénéisée  
Univ. de Pisa, February 1995.

Gamma convergence and memory effects.  
Colloque EurHomogenization- Homogénéisation et applications aux Sciences  
des Matériaux, Nice, June 1995.

Effets de mémoire dans des mélanges élastiques-viscoélastiques  
Univ. de Toulon et du Var, November 1996.

Efeitos de memória em misturas elasto-viscoelásticas  
I.S.T., Lisboa, November 1996.

Une Méthode Globale de Relaxation dans BV  
Univ. de Toulon et du Var, May 1997.

Memory effects in elastic - viscoelastic composites.  
Workshop on Composite Materials and Systems with Multiple Scales,  
Hillerød Denmark, November 1996.

Memory effects in elastic - viscoelastic composites.  
International Conference on Applied Analysis (dedicated to J. Necas),  
I.S.T.- Lisboa, February 1997.

A global method for relaxation on BV and its applications to homogenization  
Congress I.S.A.A.C. '97 (International Society for Analysis, Applications and Computation)}, University of  
Delaware, June 1997.

Relaxation d'une énergie à interface fixée  
Univ. de Toulon et du Var, February 1998.

Une méthode globale de relaxation et quelques applications  
Univ. de Montpellier, June 1999.

Interaction between bulk and surface energies: a relaxation approach  
Colloque Optimisation de Forme}, C.I.R.M., Luminy, June 1999.

Pequenas Escalas e Homogeneização  
F.C.U.L., October 2000.

Bending moment in membrane theory.  
Colloque Optimisation de Forme, C.I.R.M., Luminy, July 2003.

Bending moment in membrane theory.  
E.M.S. Math Weekend, Sociedade Portuguesa de Matemática, Lisboa, September 2003.  
Bending moment in membrane theory.  
Homogenization and Optimal Design, University of Pisa, October de 2003.

Bending moment in membrane theory  
I.S.T., Lisboa, November 2003.

Momento de flexão em teoria de membranas  
Univ. of Coimbra, November 2003.

Estimations d'erreur dans un problème d'homogénéisation à coefficients presque-périodiques  
Univ. de Toulon et du Var, January 2004.

Error estimates in an almost-periodic problem  
Encontro Nacional da Sociedade Portuguesa de Matemática, Porto, May 2004.

A Linguagem da Ciência  
F.C.T.-U.N.L., Monte da Caparica, Novembro 2005.

On the curvature and torsion effects in one dimensional waveguides  
8ième Colloque Franco-Roumain de Mathématiques Appliquées, Chambéry, France, 28 août-1er septembre 2006.

On the curvature and torsion effects in one dimensional waveguides  
1st Iberian Mathematical Meeting, Lisbon, Portugal, February 2007.

On the curvature and torsion effects in one dimensional waveguides  
9th US Congress on Computational Mechanics, S. Francisco, USA, 2007.

Dimensional Reduction and Spectral Problems  
Workshop on Partial Differential Equations, Optimal Design and Numerics, Pedro Pascual Benasque, Center for Science, Benasque, Spain, 2007.

Some Dimension Reduction Effects in P.D.E.  
Fourth Pacific Rim Conference on Mathematics, Hong Kong, 2007.

Some geometrical effects in dimension reduction  
Center for Nonlinear Analysis, Carnegie Mellon University, USA, April 2009.

Waves in a thin periodic medium  
2nd Workshop on Thin Structures, Nápoles 9-11 September 2010.

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#### **Outras comunicações orais**

Compacidade por Compensação  
C.M.A.F., Lisboa, October 1980.

Aplicação da Compacidade por Compensação a problemas de Hidrodinâmica  
C.M.A.F., Lisboa, December 1980.

Sobre a representação integral da equação  $k - k^*g = g$   
C.M.A.F., Lisboa, February 1982.

Sobre a homogeneização da equação  $u'(x,t) = b(x,t)u(x,t)$   
C.M.A.F., Lisboa, June 1982.

Caractérisation du noyau dans un problème d'homogénéisation non linéaire à coefficients dependents du temps  
Univ. Autónoma de Madrid, December 1983

Cálculo das Variações e Homogeneização  
C.M.A.F., Lisboa, February 1987.

Homogenization of a viscoelastic equation with non periodic coefficients.  
Equadiff 87, Univ. Democritus, Xanthi, Greece, August 1987.

Aderivation of generalized bending and torsion models for multicellular linearized elastic beams by asymptotic expansion methods  
IV Congresso Nacional de Mecânica Teórica e Aplicada, Univ. Coimbra, December 1987.

Homogenized behaviour of a beam with a multicellular cross section  
Journées de Metz en Homogénéisation -Hyperélasticité, Univ. Metz, March 1988.

Homogeneização e viscoelasticidade  
C.M.A.F., Lisboa, April 1988.

Homogenized behaviour of a beam with a multicellular cross section  
2nd Week on Asymptotic Analysis, C.M.A.F., Lisboa, July 1988.

Homogeneização em teoria de vigas  
C.M.A.F., Lisboa, February 1989.

Comportamento homogeneizado duma viga com uma secção multicelular  
IV Encontro Nacional da Sociedade Portuguesa de Matemática, Univ. Porto, April 1989.

A Galerkin Approximation method in multicellular beams  
Workshop on Composite Media and Homogenization Theory, I.C.T.P., Trieste, January 1990.

Método de Galerkin espectral em teoria da elasticidade-Homogeneização  
C.M.A.F., Lisboa, January 1990.

Gamma - limite de um problema com memória  
C.M.A.F., Lisboa, January 1991.

Gamma-limit of a functional associated to memory effect phenomena  
European Conference on Elliptic and Parabolic Problems, Pont -à-  
Mousson, France, June 1991.

Gamma - limit of a functional associated to memory effect phenomena  
Equadiff 91, Barcelona, August 1991.

Função de empenamento e função de torção em secções Perfuradas  
C.M.A.F., Lisboa, March 1992.

The warping, the torsion and the Neumann problem in a quasi periodically perforated domain  
Topology Design of Structures, Nato Advanced Research Workshop, Sesimbra,  
Portugal, June 1992.

Homogenization problems in locally periodic perforated domains  
Second Workshop on Composite Media and Homogenization Theory, I.C.T.P.,  
Trieste, September 1993.

Um método global de relaxação em BV e aplicações  
C.M.A.F., Lisboa, July 1997.

O momento de flexão em teoria de membranas  
C.M.A.F., Lisboa, January 2002.

Efeito de torção e curvatura em guias de ondas unidimensionais  
C.M.A.-U.N.L., Monte da Caparica, Maio 2005.

#### **Comunicações em painel ("poster")**

Fading memory effects in elastic - viscoelastic composites  
XIXth International Congress of Theoretical and Applied Mechanics, Kyoto,  
August 1996.

#### **11. Communications in scientific meetings**

<b>Language</b>	<b>Reading</b>	<b>Writing</b>	<b>Conversation</b>
English	Very good	Very good	Very good
French	Very good	Very good	Very good
Italian	Good	Basic	Basic
Spanish	Good	Basic	Basic